RURAL EQUITABLE ECONOMIC GROWTH ACTIVITY (CRECER)

SAN SALVADOR, EL SALVADOR

EVALUATION OF EL SALVADOR'S FOUR MAJOR IRRIGATION DISTRICTS

- ATIOCOYO NORTE, ATIOCOYO SUR, LEMPA-ACAHUAPA, and ZAPOTITAN -

ADMINISTRATION AS WATER USER ASSOCIATIONS

FOLLOW-UP ACTIVITIES

FINAL REPORT - February 13, 1998

Prepared By:

Jack Earl Farmer, PE and Water Resources Specialist
CRECER Project (Chemonics International, Inc.)
USAID Contract No.: 519-C-00-94-00154-00

Submitted to the Government of El Salvador (GOES)
and USAID/El Salvador

January 24 to February 14, 1999
San Salvador, El Salvador

LETTER OF TRANSMITTAL

To Richard Clark, COP, CRECER

cc Hugo Ramos, CRECER
Christian J Kolar, CHEMONICS

Date February 13, 1999

Subject **Transmittal of Final Report - EVALUATION OF EL SALVADOR'S FOUR MAJOR IRRIGATION DISTRICTS; - ATIOCOYO NORTE, ATIOCOYO SUR, LEMPA-ACAHUAPA, AND ZAPOTITAN -ADMINISTRATION AS WATER USER ASSOCIATIONS -FOLLOW_UP ACTIVITIES**
January 24 to February 14, 1999

Enclosed please find a copy of my final report on the above activity

The basic findings and recommendations are a follow-on to my previous report with further clarification and examples We still recommend that every effort should be make to proceed forward with the transfer of the four Irrigation and Drainage Districts from the Government of El Salvador to the four Water User Associations as soon as agreements on cost sharing are finalized for each separate district

With everyone help (CRECER, GOES, MAG, WUA's, TechnoServe, etc) I believe that we have been able to move forward in my three week consulting time period However, there remains activities that need to be immediately pursued that are indicated in the report, along with follow up and monitoring to allow this action to be successfully completed

More exact financial details, especially related subsidies during the transfer period need to be developed and accepted in order for both parties to be able to do accurate planning and budgeting

It was a pleasure to work in El Salvador again, and I wish to thank all of those who greatly assisted me in preparing this report

Respectfully submitted,

Jack Farmer

Jack Farmer, Water Resources Specialist

Enclosures as noted above

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ACRONYMS AND ABBREVIATIONS

AID	U S Agency for International Development Agencia para el Desarrollo International de los Estados Unidos
DGRNR	Direccion General de Recursos Natuales Renovables
FAO	Food and Agriculture Organization of the United Nations Organizacion de las Naciones Unidas para la Agricultura y la Alimentacion
GOES	Government of El Salvador
ID	Irrigation District
I&D	Irrigation and Drainage
MAG	Ministerio de Agricultura y Ganaderia
O&M	Operations & Maintenance
USAID	U S Agency for International Development Agencia para el Desarrollo International de los Estados Unidos
TA	Technical Assistance
TNS	TechnoServe
WU	Water User
WUA	Water Users Association
WU-G	Water User - Group

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APPENDIXES

I EXECUTIVE SUMMARY - February 13, 1999

1.0 BACKGROUND AND PRESENT STATUS

This report is based on the legal "Transfer Agreement' prepared by CRECER's Attorney and is designed to interface with that document in it's present form To our knowledge there are no known legal conflicts However, there are some specific legal, technical and economic implementation issues These are pointed out and/or discussed in the different sections of this report The technical and economic evaluations are based on the information provided for the previous report and information and data collected during this report time period

Between the previous July 31, 1998 report and this report, there have been numerous presentations and projected budgeting which included proposed cost sharing, developed for negotiation purposes Care should be taken not to confuse, and in some cases, to compare these negotiation numbers with the present estimated numbers Although the basic assumptions (legal, technical & economic) remain the same, the specific economic and cost sharing assumptions have been further defined by examples and quantified using numerical lengths and estimated unit costs

It is generally agreed that it is beneficial, advisable and economical to transfer the administration of the four I&D Districts from MAG/GOES to the WUA's for a 50 year lease period At present Zapotitan, Atiocoyo Norte and Atiocoyo Sur are in a position to implement the transfer However, Lempa-Acahuapa has various problems Hurricane Mitch damage, project not fully completed, and the lack of trained WUA staff Therefore, it is recommended that Lempa-Acahuapa be transferred at a later date but under the same general transfer agreement conditions as the other three irrigation districts

At the time of the irrigation districts administrative transfer to the WUA's, would be the transfer of the responsibility for normal I&D system annual O&M costs GOES would still be the legal owner of all physical assets and therefore, would still be responsible for all I&D system major repairs, replacements, rehabilitations and improvements (betterments), as well as any system damage caused by natural disasters and/or acts of god.

The separation of cost sharing needs to be defined in detail, both general and specific for each separate I&D District

A ten year transfer period has been agreed to for the initial period of cost sharing of certain costs, mainly electrical energy costs for pumping of irrigation water supplies The defining of cost sharing during 1) the first 10 year transfer period, 2) the remaining 40 years, and 3) the whole 50 year period need to be clarified

Therefore the main purpose of this follow-on report is to assist in further defining of responsibilities and cost sharing between MAG/GOES and the WUA's for all three time periods Consideration of the water-users/farmer's ability-to-pay is an important factor in determining cost sharing Another major factor to be considered is the bare substance economic level of those land-owners/holders who have only 1 to 3 Ha (especially those with 1 or less Ha) Their present ability-to-pay is below the present average water tariff needed for normal annual O&M costs

As pointed out in the previous July 1998 report, the four I&D Districts systems are below an acceptable level for sustainable O&M as they have a back-log of "deferred maintenance" not completed to date In some cases, I&D system partial rehabilitation has taken place In other cases their rehabilitation needs have been defined, and/or only the most "critical" (immediately needed) deferred maintenance has been defined

The basic principal is the four I&D districts should be brought up to an acceptable sustainable O&M level by MAG/GOES either at the initial time of transfer or during the initial transfer period This time period was originally recommended to be 5 years but is now set, and accepted by all, at 10 years by MAG/GOES, when donors funding assistance could be found

Other Issues/Factors Related to Defining Cost Sharing

- What other cost sharing is limited to the 10 year transfer period other than the 10% per annual deferential for electrical energy at Zapotitan and Atiocoyo Norte?
- What other cost sharing is there during the balance of the 40 year period?
- What other cost sharing continues for the whole 50 year period?
- After the signing of the transfer agreement, a "Background Document" or a Memorandum of Understanding (MOU) related to activities that are be undertaken, must be developed
- An agreement with the Ministry of Public Works for I&D Districts Road Maintenance responsibility must be developed
- Rehabilitation and /or critical deferred maintenance needs must be defined
- Costs for new construction of measuring devices must be identified
- WUA's training needs must be identified
- WUA's technical assistance needs must be identified

- Evaluation and comments on water-users/farmer's "ability-to-pay" the water tariffs (charges) need to be itemized and clarified

- Comments and recommendations on specific issues and constraints relate to each separate I&D District need to be identified and developed

- A review and evaluation of I&D Districts budgets and tariff, with an understanding of the cost sharing on defined expenditure items must be developed

The current I&D District's information is based on the physical system works within each I&D system to be administratively transferred The responsible for the administrative costs and normal annual O&M costs have been allocated to the Water Users Association As GOES is still the legal owner of all physical assets, this report has tried to prorate (budgetary allocation) that portion recognized and previous identified with the Rehabilitation and Critical Deferred Maintenance needs of the I&D systems This was done with the realization that funds would have to be made available from GOES funding and/or Donor funding where possible

With these modifications we are able to apply the cost sharing rational to the 1999 year budget based on the present 1998/99 irrigation season budgetary numbers, in addition to the needed new construction of water measuring devices, etc The cost/value of contributed Water User's labor have been included in order to more nearly reflect the actual cost for water service It is then easier to look at the actual costs of providing irrigation water service

2 0 ATIOCOYO NORTE

Atiocoyo - Norte with it low contributed labor cost factor, high electrical energy costs, and high drainage maintenance costs does not present as favorable a cost sharing situation for both the GOES and it's water-users as does Atiocoyo Sur However, with their double cropping of half of the area every other year in rice gives them a high economic payment capability

2.1 Recommendations

Rehabilitation

The I&D system needs to be rehabilitated and/or a critical portion of deferred maintenance done immediately over a set programs period This includes the pumping action and three electric pumps (3-300hp) The GOES/MAG is aware of this problem and is trying to secure funding

It is recommended that consideration be given to the immediate repair and/or replacement of three Norte pumps in sequence (worst-one-first) this year A detailed technical study needs to be completed in order to show cost savings to include replacement with diesel pumps

This would help lower the electric costs and improve flow volume Our discussions with WUA staff indicate that this would be accomplished as the present operating practice during the irrigation season is to charge (fill) the system by using all three pumps They then operate with one pump for a month, start the second pump during the second month, and finally start the third pump at about three months

Alternate Gravity Water Supply

It is further recommend that a "Desk-top Study" (pre-feasibility type that collects existing information and studies) be made in order to look at the alternative of developing a gravity supply to eliminate the high present cost of pumping If the yearly cost of electric is 2,500,000 Colones then (2,500,000 x 50 (years) = 125,000,000 Colones would be the cut-off cost for considering alternative gravity supply costs

The following points were made for technical justification for a gravity up-stream diversion Replacement of the Atiocoyo Norte original designed siphon is not practical at this time as there is not sufficient flows in the river at the point of diversion It has been estimated that an up-stream gravity diversion would cost 60 0 to 70 0 Mil and that would be an energy savings of 2 5 Mil per year Therefore, in 24 to 28 years, the energy savings would equal the initial construction cost

Further technical and economic studies need to be completed immediately in order to evaluate
a) payment of electrical energy during peak hours,
b) replacement of pumps with either electric or diesel pumps, and
c)alternate up-stream gravity diversion

3 0 ATIOCOYO SUR

Atiocoyo - Sur with it high contributed labor cost factor presents a very favorable cost sharing for both with GOES and with it's water-users

3.1 Recommendations

As discussed earlier, this district has rehabilitation needs However, the timing of construction should occur during the non-irrigation season

The I&D system needs to be rehabilitated and/or the portion of critical deferred maintenance programmed over a set period The GOES/MAG is aware of this problem and is trying to secure funding

4 0 ZAPOTITAN

4.1 Recommendations

Sector #5 and perhaps the balance of the gravity service areas should be at a gravity tariff rate (set volummetric block amount, perhaps related to size of Land holdings)

The pumped areas and the well service areas should be at rates to cover electrical energy costs If and when exact areas and energy cost can be determined, it may then be desirable to set elevation service areas A simplified form of estimated volummetric block flow is recommended until measurement structures are sufficiently in place to provide accurate volummetric measurements

All general report recommendations should be implemented over-time to the extent economically feasible.

Conclusion
When all actual costs (ie equipment) per the present legal "Transfer Agreement' are accurately incorporated into the present tariff structure, an evaluation related to transfer can be more realistically made

When the ability of the water-users in Sector #5 and perhaps most of those in the balance of the gravity served area are recognized by a separate tariff as previous recommend above This raises serious concern related to the ability and willingness of the water-users/farmers in the district to pay

At this present time there is not, ready available, sufficient economic/cost data to evaluate the transferring of this I&D District for a period of 50 years

When sufficient data is available and there is, at the least, a practical and acceptable implementation plan for same We can assist in the re-evaluation of transferring this I&D District

5 0 LEMPA - ACAHUAPA

5 1 Recommendations

It is recommended that MAG/GOES proceed to secure emergence funds to make the necessary emergence repair as soon as possible

It is further recommended that the backlog of deferred maintenance during construction be

picked up by a set program for same Rules & Regulations should be adopted so as to prevent encroachment and breaking of canal linings for washing cloths, etc

If the designed on-farm irrigation efficiency of 40% is achieved and the lack of on-farm volummetric water measurement is corrected by installing measuring devices below the present unit level (average of 50 Ha) to 20 Ha average, this would be quite an acceptable starting point

II FINAL REPORT - FEBRUARY 13, 1999

1.0 BACKGROUND AND EXTRACTS FROM THE JULY 31, 1998 REPORT - EVALUATION OF EL SALVADOR'S FOUR MAJOR IRRIGATIONS REPORT

At present a "Transfer Committee" composed of both Government of El Salvador (GOES)/Ministry of Agriculture (MAG) and Water Users Associations's (WUA) personnel meet almost weekly in order to facilitate the preparation of a legal agreement to transfer the administration of Irrigation and Drainage Districts (I&Ds) from GOES/MAG to the WUAs Various points have been discussed and some documented points agreed to in principal Other activities have been completed and/or are underway

A draft legal document has been prepared and needs to be finalized This would allow transfer of ID administrative responsibility to the WUAs for a fifty year concession period The initial four IDs to be transferred are Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan The three older irrigation districts are to have their main systems (canals, drains and roadways, etc) rehabilitated by the GOES to the extent that donor assistance funding is available

New legislation now being drafted would form a Federation of WUAs and would include the four major Irrigation Districts, Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan The Federation would assist farmers through the WUAs in the purchase of inputs (seeds, fertilizers etc) and commercialization (marketing/finance, etc) activities

One of the main results of this technical assistance activity (Output) will be to support the Minister and the Water User Associations in finalizing the district transferring negotiations and to strengthen other type of rural enterprises.

At present the four I&Ds/WUAs are assessing in the districts activities and collecting an "out-of-pocket' amount as water charges These vary from district to district The present financial and economic conditions are difficult, as the I&D-WUAs have no legal means to enforce collect of payments until the administrative right is transferred

There is no question about the desirability and the need to transfer the administration of the four I&D Districts from the GOES to the WUAs This administrative transfer would be advantageous to the GOES, who would be relieved of the responsible for the cost of the administration of the four I&D Districts, and the Water Users, who would benefit from the lower administrative costs of the private sector salaries and benefits

However, all of these cost issues are over shadowed by the ability of the land owners to pay This is especially true of the smaller land owners (1-3 Ha) who are usually at only a bare subsistence level.

1 2 Present Status

1 It is mutually agreed that it is beneficial to transfer the four I&D Districts administration and annual O&M from Mag/GOES to the Water User Associations

2 It has been agreed that the length of the transfer period shall be ten years However, the date for start of implementation needs to be finalized.

3 It has been agreed that the annual percentage of cost sharing of electrical energy for pumping at Zapotitan and Atiocoyo Norte during the 10 year transfer period will be a 10% annual decrease on the part of the GOES The first year starting figure will be 90%, except for charges during peak daily time period of 6 00pm to 11 00pm

This procedure is workable at Zapotitan as the I&D system was designed for 18 hours per day and six days per week operation

However, at Atiocoyo Norte, the I&D system was designed for 24 hours per day and seven days per week operation Additionally, the present three lift pumps are in very poor condition (operating at less than 60% of design flow capacity) and need immediate replacement Technical and economic justifications are to be made for not only pump replacements and operations during the peak period, but also for a up-stream gravity diversion to be completed in the next 5 to 6 years

4 An acceptable mechanism or Memorandum of Understanding needs to be developed to the effect that the Water User Associations (WUA's) are not required to budget nor collect for I&D investment debts, and the outstanding GOES I&D-O&M debts and water charges

The WUA's will only collect their own outstanding charges

5 The original decrees forming the I&D districts define the physical assets, irrigation system, drainage system, and roadways by nomenclature A, B, C, & 1, 2, 3, etc , and by lengths (Kms), widths (mts), and area (Ha), in addition to buildings, pumps, and wells, etc related to the original design layout Over the years the systems have been changed Therefore, an accurate system inventory for each separate I&D District needs to be made and verified by GOES and WUAs

Additionally, in the original I&D decrees for Zapotitan, Atiocoyo Norte and Atiocoyo Sur, there were lands set aside and defined as "Agricultural Demonstration" areas These lands no longer exist in Atiocoyo Sur However, in Atiocoyo Norte and Zapotitan, they have been cultivated by the I&D District

It is recommended that these lands be included in the administrative area being transferred to Atiocoyo Norte

This overall activity needs to be finalized

6 It is advisable to transfer the administration of the original I&D District decrees, as to lengths, widths, and areas but require the WUAs to operate and maintain only the present actual useable lengths, widths and areas Buildings, Structures and Stationary Equipment should be transferred in a similar format as that of the physical assets

This overall activity needs to be finalized

7 An accurate up-to-date inventory should be made that includes the make, model, year (age), and present condition of all equipment These inventories can then be compared to needs and costs for further discussions At the minimum, all non-usable equipment should be returned to the GOES for disposal and/or salvage A transfer memorandum can be developed based on transfer methodology needs and an understanding of cost responsibility, etc

In order to properly evaluate the equipment, under the present conditions, the following actions need to be taken

- Prepare equipment inventory lists per format already developed
- Secure original equipment costs and/or present replacement costs
- Add the information concerning 'average number of workdays used per year' to the equipment list
- Compare and evaluate the need for the construction equipment presently available for transfer to O&M uses, to that of the actual equipment needed
- Check on possible equipment exchanges with the Ministry of Public Works

This overall activity needs to be finalized

8 In order to assure the capability to supply the designed flows, the administrative use of the diversionary water rights also needs to be transferred

This does not seem to be a problem except at Atiocoyo Sur where they are presently diverting more than their original water right It is recommended that Atiocoyo Sur ask MAG/GOES to support them and declare their present diversion amount as an historic water right until formal river water rights are defined

9 The rapid appraisal of each district's ability to equitably distribute water indicates that El Salvador's laws and legal responsibilities clearly imply, from the volummetric division point (water right) that initial measurement is mandated by the I&D designed water service (liters per second per hectare)

15

Further measurement structures should be constructed within the distribution systems and each individual on-farm outlet so as to assure equitable water distribution

Information concerning the individual I&D districts' complete assessment of measurement structure needs and programs, as well as annual allocation of funding to include cost sharing, needs to be finalized

10 Usually there is a value put on water, 1) at the point of diversion (water right value) or, 2) a cost so as to protect the water diversion volume and quality The water cost value of 2) could be based, at a minimum, to equal the GOES' cost for I&D district systems original investment costs and the monitoring cost which is presently estimated at an average cost (minimum) of 100 to 200 Colones per Ha.

11 Overall, the high cost differential between present charges and sustainable levels of the I&D Districts indicates that a cost phasing system over an initial ten year period is more realistic Standard percentages should be 10% per year at a minimum, if the annual budget cost are to remain in the proposed recommended 15% annual increase, plus annual inflation

12 Recently, the El Salvador electrical energy sector was privatized This resulted in the formation of five electrical distribution service companies with set service areas CLESA is the electrical service company for service to Zapotitan I&D, and DEL SUR is the service company for Atiocoyo Norte I&D Electrical distribution companies buy power from various suppliers and then distribute/transmit energy to their areas electrical consumers/users Distribution companies add their transmission and administrative costs plus a 10% profit to the initial supply cost

The charge for Medium Demand Energy of more that 10 kw and less than 50 kw is

a) 9 68 Colones per month for commercialization and 64 63 Colones per kw/month for distribution, with hourly energy rates per kwh of 0 847 Colones for High,
b) 0 196 Colones per kwh for Low, and
c) 0 658 Colones per kwh for Remaining Hours

Newspaper articles indicate that with the additional electrical energy power plants to be put into service in the future, the cost of electric, to some extent, will be lower Additionally, the Central American Inter-tie Grid and other existing energy plants should also have more electricity available shortly

Now is the time to start discussions with GOES, CELL and others on the subject of different infrastructure and/or sector tariff rates, in particular a lower agriculture irrigation pumping energy rate

13 The normal development procedure for I&D districts' irrigation tariff structures would be to develop the costs of annual operations and maintenance and other long term (20 year period) costs for investment cost recovery, additional new construction, rehabilitation, major equipment repairs and replacements, training, additional technical assistance and other special items These cost would then be prorated over the 20 year period as annual expenses **This means that the I&D districts prorating of costs will have to be done at least three times during the 50 year administrative transfer period**

14 To facilitate planning and budgeting for irrigation water charges, the Detailed Planning Expenses Budget format and a Summary Major Line-Item Budget format have been developed Once the initial detailed planning expense budget is developed, the estimated expenditures have to be balanced against income Most of the income would be in the form of water service charges However, all true I&D district income must be shown, e g , rental of equipment, and production profits off of district lands, etc All non I&D income and expenditures (land preparation and harvesting, etc) must be separated

The separation of non-irrigation and drainage activities from other activities (ie agriculture) by each I&D District is mandated to assure equal cost sharing between WUA's and MAG/GOES in the I&D 's transfer agreement

Separate detailed stand alone agricultural budgets must be made to the same format as the I&D budgets Excess annual income from I&D budgets can not, under the transfer agreement, be used to off-set other (ie agricultural) budgets However, other incomes can be used to balance I&D budgets, particularly portions of contingencies

15 Further balancing between income and expenditures is required related to at least two other major factors, (1) the true ability of the Water Users/Farmers to pay any increase, and (2) the present water rate charge Normally, any increase of over 15% will not be accepted without 70 to 85% of the WUs knowing and agreeing to any higher amount

16 At present there appears to be an WUA's training immediate need for at least the following

- Planning and awareness of laws and other legal requirements
- Budgeting, accounting, and monitoring and evaluation procedures and practices
- Improved communications and public relations

17 One of the first initial TA activities needed is to develop a standard set of Rules and Regulations (R&Rs), to include WUA's employment policies and practices for all the I&D districts

18 All known major issues and constrains have been identified The present situation/status

has been evaluated against the desired or required level for sustain ability The resulting recommendations are based on findings, observations and discussions, and take into consideration the different aspects of economic, social and political situations effecting each issue and/or constraint

19 With the basic initial differences in the positions of the Water Users and the GOES, it was apparent that the **NO-ACTION (status quo) scenario** would have to be evaluated The preliminary evaluation of this scenario reflects a minimum loss over a 15 to 20 year period to both parties **GOES loss of $25 0 +/- million dollars and Water Users in the range of $9.0 to $18.0 +/- million dollars** Most of this loss is in land values and reduced production due to the farmers returning to rain-fed agriculture

20 Negotiations on the transfer of the I&D Districts must be continued in order to resolve all related issues and constrains Detailed recommendations are listed in this report

2 0 ACTIVITIES - INTERVENING TIME PERIOD (between June/July 1998 and February 1999)

Transfer of Irrigation Districts to Water User Associations
Follow-up Activities by CRECER and Others

1 Complete legal transfer agreement document and have it accepted

2 Develop "letter of agreement in principal" as recommended

3 Secure agreement on transfer time period (5 or 10 years) and then define as many subsidy percentages as possible

4 Monitor, with assistance from TechnoServe, the Districts preparation of

a) Detail Physical Inventories

b) Detailed Equipment List
Make Model/Year Condition Original or Replacement Costs

c) Draft Planning I&D Budget for July/August 1998 thru December 1999
(per forms in this report) and propose budgets for the next 4 / 5 years)

d) Draft separate planning budgets for all other activities per c) above

e) Adapt I&D District Rules and Regulations
Items #4-a) and b) should then be attached to the transfer agreement for each

separate I&D District

5 Assist both the I&D Districts and GOES in securing data from others
- CLESA and DEL SUR
- Ministry of Public Works on Proposed Rural Roads Program
- Natural Water Resources on river flows, etc

6 Legally form Federation of Water Users Association and undertake information and public relations program related to present electrical energy tariff and other activities

7 Undertake the start of as many of the other report recommendations as possible

3 0 GENERAL PRESENT ACTIVITIES

1 MAG has agreed to a 10 year transition time period for electrical energy cost sharing, on only pumping (Pumping Stations & Wells at Zapotitan and Atiocoyo-Norte) starting in 1999 at 10% annual decrease, except for peak time (6 00pm to 10 59pm) energy, (90% GOES and 10% I&D Districts -1999)

Implementation procedures between I&D's and MAG/GOES need to be agreed upon

Notes 1) The Irrigation Season is usually from November to May (7 months)
2) GOES budget year is January to December (12 months)
3) One method would be to have separate contracts (6 3 months - GOES and 0 7 months - I&D's)

2 MAG has verbally agreed to non-collection of over-due GOES tariffs (last 10 years), by the WUA's Only the WUA's dues are payable

This action needs to be acknowledged in a background document and/or a Memorandum of Understanding (MOU)

3 Confirmation of MAG's verbal agreement to the payment of I&D Districts - I&D system "major" system and equipment repairs and replacements cost over Colones 30,000 00, during the 50 year lease period needs to be clarified

A MOU on defining I&D system components needs to be made

100% of the equipment preventative maintenance cost are to be paid by I&D districts Implementation schedule and payment procedures between I&D's and MAG/GOES need to be agreed upon

4 Confirmation of MAG's verbal agreement to the payment of I&D Districts New

Construction costs over Colones 30,000 00, during the 50 year lease period needs to be clarified

Implementation procedures between I&D's and MAG/GOES need to be agreed upon

5 MAG has agreed, after signing of the "Transfer Agreement", to convention to Ministry of Public Works, the responsibility for maintenance of I&D District roads

Roads need to be further defined as to location, length and width - not as shown in the original decree The frequency and level of maintenance also needs to be defined.

6 I&D Districts (Zap , A-N, A-S) will designate equipment they want to retain and the balance of equipment is to be returned to MAG

MAG will pick up equipment from each I&D District (Due to Hurricane MITCH, there is no information from Lempa-Acahuapa on this matter)

7 The Draft Budgets for Zapotitan, Atiocoyo Norte, Atiocoyo Sur will have to be revised (lowered to minimum) so as to meet requirements of "ability-to-pay" A "Cash Flow" Analysis will have to be made in order to assure that there is adequate cash available for I&D's O&M

8 Water Rights (diversion amounts) Volumes were discussed

I&D District	Written in Law	Solicitous	Method of Irrigation
Zapotitan	2,387 lts/sec	OK	
Atiocoyo Norte	1,800 " "	OK	
Atiocoyo Sur	2,600 " "	3,700*	1 07 lts/sec/Mz

Lempa-Acahuapa - (no information)
* (present volume of diversion)

It is recommended that Atiocoyo Sur request MAG/GOES to support their historical water usage amount

9 Irrigation & Drainage Tariff Structures (Discussion)
I&D tariff's can be developed to include the following factors(charges)

- Land holdings (without receiving water)
- Volume of water delivered
- Other special factors

Note A detailed discussion of this issue was presented in our previous report (July 1998) The recommended tariff structure would be a combination of volumentric charges and charges related to the size of the landholdings Thus the water-users would

pay for the amount of water used with a relationship of ability-to-pay based on sizze of landholdings

10 There is a need to correct I&D Districts present actual inventories before including them in the Transfer Agreement, especially mobile equipment due to it's high values in cost sharing

The following General Information was provided by TNS (1/28/99) and will be verified by each I&D District

I&D -Districts 1998/99		Tariff Amounts (Colones per Ha)	
Zapotitan	411		
Atiocoyo Norte	571	+	285 for 2nd rice crop
Atiocoyo Sur	214	+	special assessment for electrical energy
Lempa-Acahuapa	550		

OBSERVATIONS AND COMMENTS

1 With the signing of the Transfer Agreement, strong justification can be found for requesting the start of the Transition Period to be deferred until next year (2000) However, if this is not possible nor acceptable, then within the internal I&D budgets, (Zap & A-N) adjustments can be made to help off-set this cost
Note On the same day of the transfer committee meeting (1/28/99) there was a meeting at Zapotitan related to the restoration of electrical energy It is my understanding that MAG/GOES has agreed to pay the electrical power bills for 4 more months (until the end of May 1999) This is a reasonable spilt as it would cover most of the 1998/99 normal (7 month) irrigation period.

2 Technical and economic justifications can be made for using power during peak hours in Atiocoyo Norte This is due to the need to re-fill the long gated irrigation system each day

3 The immediate replacement of at least the Atiocoyo Norte pump motors can also be justified.

4 It is obvious that the Atiocoyo Norte pump diversion should be replaced with a gravity diversion as soon as possible (5/6 years) in order to lower cost over the balance the 50 year period

5 The only justification for the Colones 30,000 amount/number used in item I- 3 &4 above is related to the ability-to-pay of the farmers This could amount to a savings of 1 to 2 million Colones per year to the I&D's

6 There are strong concerns at this time as to the ability of the I&D's to make adequate Budgets and Cash Flow Analysis, in addition to implementation and collection of water charges

7 Uniform General I&D Rules and Regulations (R&R's) and Specific R&R's for each district need to be developed, approved and implemented as soon as possible These are needed to support the implementation of their tariffs

3 1 High Electrical Energy Cost Sharing Between GOES and Zapotitan and Atiocoyo Norte I&D Districts

3 1 1 Zapotitan

The Zapotitan I&D system was originally designed for only 18 hours per day operation and has 10 different diversion points Therefore, the decision by MAG/GOES not to pay peak hour electrical energy charges (5 00pm to 11 00pm a five hour period) is not a technical or economic disadvantage at this time

However, over time without an adjusted internal electrical energy rate for irrigation pumping, technical changes to lower electrical energy costs will probably have to be made

It is understood that on 1/28/99, MAG/GOES agreed to pay the electrical energy bills for four months until the end of May 1999 This essentially covers the main part of the 1998/99 irrigation season

3 1 2 Atiocoyo Norte

Present Status

1 At this time, the electrical energy bill is still in MAG/GOES name and outstanding (unpaid) charges amount to about 2 0 Mil Colones

It is **recommended** that MAG/GOES agreed to pay the electrical energy bills for four months until the end of May 1999, as was agreed to for Zapotitan As this essentially covers the main part of the 1998/99 irrigation season, it is very helpful to the district

2 Atiocoyo Norte is willing to pay the re-connection charges, after the transfer Agreement is signed, and when cost sharing is started

3 Need for technical and economic justifications for the following

- Present high electrical energy pumping costs
- Present low efficiency of each pump's operation
- Justification for replacement of pumps
- Justification for operating pumps during peak times
- Justification for canal rehabilitation (raising of canal linings)

4 The following information was request Some of the items were provided
a) Requested that copies of the electrical energy bills for the 1998 year be secured from DEL SUR. Copies of three electric bills were provided

b) That Atiocoyo Norte staff provide daily hours of pumping during the 1998 year so as to match the energy billed to that of pumping

c) That Atiocoyo Norte staff provide high and low river elevation and elevation at point of discharge into canal It was estimated that the total difference was about 27 meters

d) The present volummetric water discharge rate for each pump

Note The pumps were tested on January 7, 1999 by operating two pump at the same time in different combinations Measurements were taken in the canal 500 meters down stream from the discharge with a set canal cross-section and a current meter The average of any two pumps in different combination was 700 lts The original capacity of each pump was 600 lts

e) It takes three pumps (1050 lts) 6 hours to prime (fill) the canal to operational level

f) Within 20 to 40 minutes after the pumping stops, operations are stopped and the canals are empty within 2 hours

g) Since December 26, 1998, two pumps have been in continuous 24 hour operation

5 The following points were made for technical justification for a gravity up-stream diversion

Replacement of the Atiocoyo Norte original designed siphon is not practical at this time as there is not sufficient flows in the river at the point of diversion It has been estimated that an up-stream gravity diversion would cost 60 0 to 70 0 Mil and that would be an energy savings of 2 5 Mil per year Therefore, in 24 to 28 years, the energy savings would equal the initial construction cost

3 2 Mobile Equipment Major Repairs and Replacement Cost Sharing Between GOES and Irrigation and Drainage Districts

At different times conflicting statement, as to the specifics of cost sharing have been received Examples are

a) The cost to the I&Ds / WUAs is up to 30,000 Colones and MAG/GOES pays all cost above that amount for *10 years ? 50 years ? or,*

b) As the I&D roads will be maintain by MOPW/GOES, there is no need for cost sharing All costs will be borne by the I&D's/WA's

These issues need to be clarified and defined

3.2.1 Transfer of Not-Needed Mobile Equipment to Ministry of Public Works for Maintaining I&D Roads on Set Schedule

MAG has agreed that after the signing of the "Transfer Agreement" they will turn over to Ministry of Public Works the responsibility for maintenance of I&D district roads

Roads need to be further defined as to location, length, width, other than as shown in the original decree The frequency and level of maintenance needs to be defined

3 2.2 Assessment of Possibility of GOES Providing Remaining I&D's - O&M Equipment Needs

Clarification of 3 2 and 3 2 1 above may resolve this issue

3 3 I&D Districts Water Distribution and Water Measurement (Metering) Measurement Structures and Practices

In the original design of the I&D system and according to the diversionary water rights, there is a mandate to have volummetric measurements throughout the entire irrigation system

El Salvador's laws and legal responsibilities clearly imply from the volummetric division point (water right) that initial measurement is mandated by the I&D designed water service (liters per second per hectare) Further measurement should be carried out within the distribution system and to each individual on-farm outlet to assure equitable water

distribution

The original I&D designs were based upon an acceptable cropping pattern (water demand), estimated system losses and/or efficiency (%) and an on-farm irrigation efficiency (%) Therefore, system diversion/measurement structures and on-farm outlet/measurement structures were constructed

However, over time and due to various factors, the use of measurements within the distribution system and at the on-farm outlets has been abandoned Most of the irrigation systems are now being operated on an visual estimation of flows which are based on experience and needs, etc

Therefore, the immediate need to re-instate volummetric measurements at all irrigation levels is mandated Tariff structures that are based on volummetric measurement are more flexible and easier to manage

The re-instalment, at all irrigation levels, of measurement structures/devices based on volummetric measurement, is mandated The costs for additional measurement structures and on-farm delivery outlet measurements devices, in addition to training and record keeping, must be added to the proposed new tariff structure

Note Not all present I&D/WUA's budgets contain provisions for these activity, and this issue needs to be resolved

Water distribution measurement and on-farm delivery point water measurement is essential for the following reasons

- Meet legal requirements to treat all water-users equally
- To allow re-distribution to limited water supply, if additional non-irrigated land request water service or reduction in diversion flows etc
- Assist in record keeping for volummetric flow charges, and in promoting increased irrigation efficiency

Measurement Structures and Practices
(references Final Report -Supplemental Data Report - June 18 to July 31,1998 - Sections #4, #5 & #6)

It is recommended that the measurement structures in the irrigation distribution systems be

- Parshall flumes if sufficient "head"(drop in water height differential) or,

25

- Modified flumes where limited head is available, or
- Rectangular weirs

For the On-farm outlets

- Rectangular weirs , and/or Siphon Tubes
- Where constant "head" is not possible either in the distribution system or at the farm outlet a simple head differential chart can be developed and used

Note In the I&D District Rules & Regulations, provisions should be made related to water measurement practices, as well as irrigation practices (where excess length of irrigation runs, related to soil type etc should be prohibited) - reference #4 in Supplemental Data Report It is recommended that I&Ds/WUAs move immediately to plan and implement a program for construction of measuring structures within the systems and at the on-farm out-lets as well as move towards volummetric flow charges This will help to secure additional donor funding for both I&D and agricultural activities

3 4 I&D - Water Users Association Training and Future Technical Assistance Needs

As reflected at the 23 July 1998 Workshop, the "voice" of the Federation of Water Users Association is 5 to 10 times greater than the voice of a single WUA This is especially true related to requesting changes in the present electrical energy tariff charges for pumping

The new Federation of Water Users Association should be formed both quickly and legally, and information and public relations activities should be started immediately

3 4 1 Water User Associations Personnel Training Needs

WUAs Leaders

At present there appears to be an immediate need for training in at least the following areas

- Planning and awareness of laws and other legal requirements
- Budgeting, accounting, and monitoring and evaluation procedures and practices
- Improved communications and public relations

WUAs Staffs

The four I&D District's staff are at different training levels and are using different practices However, all WUAs staff need training in basic office procedures as well as other standard programs

Managers, Accounts and other key personnel should meet and establish common uniform practices and procedures Then, training should start in the following fields planning, budgeting, accounting and record keeping, computers and software programs, e /g Word Perfect & Excel/ Quart Pro, and water measurement practices

Query The status of the Vigilencia (vigilance/watch) Committee added to I&D /WUA's added in December, 1998 These people will also require training

Training methodology

a) Short Courses 5 - 10 day Workshops
b) On-the-job
c) Self-paced programs

It is our understanding that TechnoServe is planning to assist the I&Ds/WUAs in their immediate needs until further funding is available This planned activity action is greatly endorsed

3 4 2 Water User Associations Future Technical Assistance Needs

Initial Transfer Activity TA Needs

I&D Districts Rules & Regulations

One of the first initial TA activities needed is to develop a standard set of Rules and Regulations (R&Rs) for the I&D Districts Related to this, TechnoServe (TNS) has developed a draft set of R&Rs in Spanish for review and adaptation To aid in this activity, an English copy of the R&Rs for the Central California Irrigation District, Los Banos, California, has been provided to TNS and is included as an attachment to this report

It is recommended that TNS review these English R&Rs and when necessary and/or desirable make changes in their draft Spanish R&Rs Each I&D district should have the ability to add special clauses that would apply only to their individual district These revised R&Rs should be reviewed by local attorneys familiar with GOES and I&D laws before the R&Rs are formally adapted by each district

10 year - Transfer Period Activities TA Needs

Improving On-farm Irrigation Efficiencies

It is a well known fact that in addition to installing measuring structures, one of the next activities to increase on-farm irrigation efficiencies would be to improve land leveling This was recognized by the Lempa Acahuapa District as it was included it's construction

activities The present land leveling methods used at the Lempa Acahuapa District are outdated practices However, it is understood that TNS is planning to bring more modern practices to El Salvador These practices will include computerized leveling programs and laser technology leveling equipment Technical assistance from TNS should be requested and, if necessary, donor funding to implement new land leveling practices within the four I&D Districts

As it will not be possible to achieve full completion of all of the activities started during the transfer period, the above mentioned activities should continue as phased activities during the Long Term Period

Diversification, Commercialization, Marketing and Improved Agricultural Practices

The on-going coordination efforts between I&Ds, TechnoServe and CENTA is greatly needed in order to provide technical assistance and services to the water-users without over-lapping costs This coordination activity is endorsed and encouraged as it will ultimately benefit the water-users/farmers

3 5 Review and Evaluation of I&D's Budgets and Tariffs

In the previous report, it was recommended that a standard detailed budget format along with recommended levels of personnel and O&M equipment be made for stationary mechanical and electrical equipment repairs and replacements This is to be based on useful life estimates For Mobile Equipment, it is recommended that basic procedures for evaluating the related costs of purchasing , operating and maintaining be based on estimated useful life periods Also used was an example of a single unit (motor grader) based on the following

- Minimum number of working days per year equal to 150- 200 days
- Estimated useful life of 12 to 15 years at 1500 hours of machine usage per year
- The annual O&M cost was estimated at Cl 225,000 per year based on a initial capital cost of Cl 3,000,000 for a 20 year time period

For the 20 year period the unit costs would be

- Minor overhauls(repairs) equal Cl 300,000 x 3 = 900,000 Colones (WUA - cost)
- Major overhauls (repairs) equal Cl 600,00 x 1 = 600,000 Colones, and
- Replacement cost at two times the original cost (2 x 3,000,000) = 6,000,000 Colones less 30 % of the original cost (900,000) as salvage value, equals 5,700,000 Colones over the 20 year period (GOES - cost)

Therefore, during the 20 year time period, the WUA should allocate (600,000 divided by 20) = 30,000 per year for this unit's minor repairs This is in addition to the 225,000 colones needed for O&M of this single unit of mobile equipment

During the same 20 year period, as GOES is the legal owner of this equipment and is obligated for major repairs and replacements in the amount of 5,700,000, a budget 5,700,00 divided by 20 - equaling 285,000 Colones per year is needed for this single unit of mobile equipment

This procedure would have to be followed for each and every piece of mobile equipment retained for I&D usage by the WUA's

An alternate methodology for defining **minor** as the level of maintenance that is required to keep (maintain) the I&D District at a normal operational level from year to year (estimated at one percent of the total investment/capital costs)

All of these defined I&D system components estimating useful life periods (civil works, mechanical works, electrical and mobile equipment) are to be equated back to an overall annual cost number (eg 200,000 colones) for estimating annual O&M costs In addition, costs for an annual portion of the backlog of "critical deferred system maintenance" must be budgeted

Major cost could the be defined as those repairs and replacements above the defined **minor** cost (eg Cl 200,000) for each system component or category that could be equated to a defined budget line-item (ie, mobile equipment)

These set **major** cash value amounts would also have to meet the additional criteria of

a) being greater than 15% of the budget line-item cost, as the overall recommend contingence amount of 15% is normally prorate per line-item in detailed budgeting and cost accounting If the set cash value was 200,000, the prorated portion of over-all contingence amount would have to be above 200,000 Colones,

b) being greater than 10% of the budget total over-all contingence (as in emergencies - up to 10% of the over-all contingence amount could be relocated to a single line-item/category) If the set cash value was 200,000, then 10% of the overall contingence would have to be greater than 200,000 Colones, and not due to negligence

Note The recommended detailed budget format and the qualifications for defining **minor** and **major** cash values are inter-related and designed to avoid disputes related to cost sharing At the present time, this alternative may not be workable for all line-items in certain I&D districts

It was in realization of high mobile equipment costs that, in the previous report, it was recommended that a detailed inventory of mobile equipment be compiled for each I&D district and evaluated

Present Status

Detailed lists were made using the following categories under Present Condition Operational , Needs Repairs and Non-usable The present legal Transfer Agreement reflects the acknowledgment of the related high cost of equipment repairs and replacements by words to the effect that

- the non-usable and not needed equipment is return to MAG/GOES,
- the equipment in fair or poor condition can be used by the WUA's and when it becomes non-useable or un-economic to be used, it is returned to MAG/GOES, and
- the newer equipment and equipment in good working order is to be adequately maintained and returned to MAG/GOES in good working order, less normal usage

This means that the portion of costs for maintain "good" equipment needs to be allocated in both the WUA's and GOES budgets.

As understood, this is not an important cost issue for Atiocoyo Norte and Atiocoyo Sur I&D's as they have very little mobile equipment. Their operational mobile equipment is mostly motorcycles which are present owned by individuals, who receive an allowance for their usage This allowance also includes O&M and minor repairs without the obligation for replacement

Recommendations

The budget format must be modified to reflect the principals as stated in the Executive Summary and the 3 5 above section of this report.

The budget format, with the available 1999 costs, must show WUA's portion of expenses and their contributed labor This would more nearly reflect the "real cost" of water service to the water-users/farmer This "real cost" would be balanced against I&D income from water charges and other income (These costs are not necessarily fully reflected in their present 1998/99 budget nor approved by the WUA's at this time) However, the combined cost to the water-users/farmers can be related their ability-to-pay

A column should be added to the budget format for MAG/GOES contributions, related to cost sharing of electric energy for pumping in Zapotitan and Atiocoyo Norte, and for other recommended cost sharing and activities that would remain with MAG/GOES as the owner of the physical assets The funding of some of these costs would depend on availability of GOES and/or donor funding available These figures would enable the clarification of defining cost sharing and implementation of related activities Written examples are attached for internal discussion of this issue

Examples are also attached in the sections for Atiocoyo Sur and Atiocoyo Norte in order to assist in defining issues related to cost sharing

3 5 1 1998/99 Irrigation Season

The 1998/99 irrigation season, if it is a normal season, would be Nov / Dec 1998 to the end of May 1999, depending on location, weather and rainfall

All the four I&D's have an operational 1998/99 budget that, depending on the exact date the transfer agreement goes into effect, may have to be adjusted before the end of the year

3 5 2 Transitional Period

A ten year transitional time period as been verbally agreed to by MAG/GOES

3 6 Evaluation and Comments on "Ability-to-Pay"

General evaluations and comments on the water users/ farmer's ability-to-pay follow in this section. However, it is also covered specifically in each districts separate section.

The general ability-to-pay and the acceptable-to-pay increases by water users/farmers is, they can and usually are willing to pay an annual maximum increase of 15% plus normal annual inflation rates (ie 5%) equaling 20% This economic cost principle is normally verifiable within a standard 15% deviation **Therefore, in this example, the maximum annual rate would be 1 20 + 0 15 = 1 35**

3 7 I&D Districts Water Distribution and Water Measurement (Metering) Measurement Structures and Practices

Water distribution measurement and on-farm delivery point water measurement is essential for the following reasons

- so as to meet the legal requirements of treating all water-users equally,
- to allow re-distribution of a limited supply of water, if there is a request for water service on additional non-irrigated farms/fields or there is a reduction in diversion flows, etc ,
- to assist in record keeping for volummetric flow charges, and
- to promote increased irrigation efficiency

Measurement Structures and Practices
(references Final Report -Supplemental Data Report - June 18 to July 31,1998 - Sections #4, #5 & #6)

It is recommend that the measurement structures in the irrigation distribution systems be

- Parshall flumes if sufficient "head"(drop in water height differential) or,
- modified flumes where limited head is available, or
- rectangular weirs

For the on-farm outlets, measurement structures should be

- rectangular weirs, and/or siphon tubes

Where a constant "head" is not possible in either the distribution system or at the farm outlet, a simple head differential chart can be developed and used

Note: In the I&D District Rules & Regulations, provisions should be made related to water measurement practices, as well as irrigation practices to include the prohibiting of excess length of irrigation runs, related to soil type, etc (reference #4 in Supplemental Data Report)

As indicated earlier in this report these activities are essential to the planned I&D program

4.0 ATIOCOYO NORTE I&D DISTRICT

Background

The entire system reflects a level of O&M below normal for continued system sustain ability, resulting in either a backlog of deferred O&M and/or the need for additional rehabilitation. The pumping station has three 300 hp pumps - the original design was for a two pump operation with the third pump on standby status At present, with all three pumps operating, capacity is still below the original designed capacity of just two operating pumps This low pumping efficiency is reflected in the high electric energy bills, and is especially costly now that the electrical energy costs have more than doubled with the new energy tariff structure

Note The original decree no 285 shows one single system. However, in initial construction a large siphon and part of the connecting canal were not constructed. A separate pumping station was installed to service northern area Therefore, a detailed accurate inventory must be made for both north and south system areas

The service area is divided into 14 sections However, #12 & #13 are not irrigated
Since 1990/91, the 12 remaining sections are divided into two service areas (1, 2, 3, 10, 11, 14) and (4, 5, 6, 7, 8, 9)

Rice is cropped in 90% of the area and most all farmers grow a rainy season crop of rice However, the ½ of the area not growing a second crop of rice receives a preference for supplement irrigation water prior to the start of the rainy season and during the dry period The ½ of the area growing a second crop of rice during irrigation season receives water on a delivery

schedule of every eight days, irrigating 24 hours per day with an estimated water delivery of sufficient water to irrigate 1 manzan (Mz) in 6 hours

However, to secure the high flows for rice, the system is operated above the canals designed water surface levels and in some sections over the top of the canal lining

In 1997/98 all water-users pay 225 Colones per Mz or 321 75 Colones per Ha , and those receiving water for a second rice crop pay an additional 200 Colones per Mz or 286 00 Colones per Ha. This results in an average yearly water cost of about 325 Colones per Mz.

The remaining 10% of the area is in pastures and/or sugar cane The WUA also rents equipment, including a rice harvester

There is a serious problem related to the lack of efficient on-farm irrigation practices One of the contributing factors in Atiocoyo is the lack of properly leveled irrigation fields This, coupled with the lack of accurate volummetric water measurement, has led to delivery of high volume of water which in turn leads to higher volumes of waste or run-off waters, which in turn leads to noticeable soil erosion

Rice has a noted high crop water requirement, and all soils (light and medium textured) are not suitable for rice production.

With the changes in original design and construction, the river diversion point, the water volummetric diversion rights, as well as the water quality need to be clarified and protected.

The revised original system design called for a pumped diversion of 1 8 m3/sec In 1997 the flow was estimated at 1 57 m3/sec However, the present (July 1998) amount is estimated at less than 50% of original design or about 1 35 m3/sec

In the original design of the system and per the diversionary water rights, it was mandated to have volummetric measurements throughout the entire irrigation system It is recommended that a system measurement be constructed at the diversion point, within the distribution system, and at the on-farm delivery points

The electric energy costs are quite high This is due to the status of the 16 year old pumps and motors at the Main Pumping Station at Atiocoyo Norte

There is a backlog of deferred system maintenance throughout the entire system in addition to the previously rehabilitation needs stated above

The drainage system is basically the natural basin terrain and the drainage water flows into seasonal streams and natural rivers As such, the maintenance is definitely 'low-cost' However, when the I&D system was originally installed, it had to be constructed across this

naturally contoured drainage systems As a result, all along the irrigation and roadway systems there are parallel drains and natural drainage crossings that must be maintained so as to protect the systems

An additional problem is the lack of control of irrigation water and in some cases rainfall, as it enters into the upper portions of the drainage system There is noticeably high soil erosion in this area, due to lack of adequate soil conservation practices

The electric energy costs are quite high. This is due to the status of the 16 year old pumps and motors at the Main Pumping Station at Atiocoyo Norte, and is reflected above

Atiocoyo Norte does not have the ability to fund the rehabilitation nor the replacement of the pumps and motors which are in need of immediate action

4 1 Proposed New WUA's Tariff Structure (February 13, 1999)

The following is an proposed new Water Users Association Tariff Structure budget for the year 1999 It includes the new line items discussed in this report

ANNUAL BUDGET - LINE ITEMS

1999 (year)

Income		Estimated Amount
Water Charges - 840 @ 571 per Ha + 420 @285 = 599,340 ?		540,000
Total Irrigatable Area	@	1 200
Area Irrigated	@	840
Equipment Rental		450 000
Services provided		
Land Profit/income		60 000
Other Income		5 000
Sub-Total		1 055 000
Contingence @ 15%	(Needed if WUA s have to Pay 13% GOES tax)	**158,250**
Total Income		1 213 250

Expenditures		**WUA**		**GOES**
	Items	Cash Cost	- Contrib Labor	Costs
1 0	Administration	**216,300**		
2 0	Annual O &M	**786,766**	125,000	3 215,419
2 1	Operations	116,230		
2 1 a	Electrical Energy	***254,859***		***2,293,729***
2 2	Maintenance	415,677	125 000	921 690
2 2 1	Irrigation system	284 878	125 000	71,220
2 2 2	Drainage system			490 470
2 2 3	Roadway system	30,000		560 000
2 2 4	Mobile Equipment	100,000		
3 0	New Construction	**32,000**		**68,000**
3 1	Measuring Structures	32,000		68,000
3 1 1	distribution system	20,000		48 000
3 1 2	on-farm	12 000		20,000
4 0	Investment Recovery &/or Replacements			
4 1	Civil Works			
4 2	Mechanical / Electrical Works			
4 3	Mobile Equipment			
5 0	Transitional Costs (5 year period)			
5 1	Training WUA -staff and Board of Directors			
5 2	Additional Technical Assistance			
Sub-total (1 - 5)		1,035 066	125,000	3,283,419
Contingencies (15% of sub-total)		155,260	18,750	492,513
Total Expenditures		**1,190,326**	**143,750**	**3,775,932**
Actual WUs Costs of water per Ha - cash cost 1 190 326 + contributed labor 143 750 equals ***1,334,076***				
Total Numbers of Irrigatable Ha.		840	840	840
Average WUs Costs of water per Ha		1 417	171	4 495

Cash costs 1 417 + contributed labor cost 171 equals ***1,588 /Ha***

The above estimated 1999 budget is based on the follow factors

Irrigated Area based on 1998/99 information equals 840 Ha 1st Crop & 420 2nd Crop

I&D System (in Kms)

Irrigation Canals Primary - 10 11 2nd - 21 15 rad - 0 9 = 32 16 total Kms

Drainage system (40 0 Ha & lengths in decree) = 24 8 total Kms

Roadways (lengths in decree) = 45 0 total Kms

Income

Income for Equipment rentals and Services provided from A-S - WUA

Contingence of 15% added to meet present legal requirement to pay 13% GOES Tax The payment of this tax was not included in budget information provided However, the WUA's can petition GOES - Ministry of Treasury and Internal Revenue Service for an exemption to not pay same

Expenditures

The WUA cash cost numbers and contributed labor, except for New Construction of Measuring Structure, was based on their present 1998/99 budget information that was provided.

The GOES costs for Irrigation and Drainage System was based on a proration of the back log of critical deferred maintenance related to the length of the systems referred to above There is a great emphasis this year on the drainage system, especially in the upper sections This is due in part to the backlog of critical deferred maintenance and the need to have adequate drainage to allow for harvesting of the first crop of rice and planting of the second crop The roadway maintenance by WUA is based on 30 small roadway repairs estimated at an average of 1,000 colones each The balance of the GOES cost for roadways is based on the 45 Kms of roads with maintenance by MOP/GOES at a frequency of 4 times per year at a average cost of 2,000 Colones per Km (4 x 2,000 x 45) = 360,000 Colones

Investment recovery and/or replacements #4 0 was not considered to be an WUA activity cost at this time

Transition Costs # 5 0 for WUA's training and additional technical assistance was not considered an WUA activity cost, at this time, as this immediate need can be recovered from within present and proposed activities already and/or the proposed donor related funding, mainly Techno Serve

Summary

Atiocoyo - Norte with it low contributed labor cost factor, high electrical energy costs, and high drainage maintenance costs does not present as favorable a cost sharing situation for both the GOES and it's water-users as does Atiocoyo Sur However, with their double cropping of half of the area every other year in rice gives them a high economic payment capability

4.2 Recommendations

Rehabilitation

The I&D system needs to be rehabilitated and/or a critical portion of deferred maintenance done

immediately over a set programs period This includes the pumping station and three electric pumps (3-300hp) The GOES/MAG is aware of this problem and is trying to secure funding

It is recommended that consideration be given to the immediate repair and/or replacement of three Norte pumps in sequence (worst-one-first) this year A detailed technical study needs to be completed in order to show cost savings to include replacement with diesel pumps

This would help lower the electric costs and improve flow volume Our discussions with WUA staff indicate that this would be accomplished as the present operating practice during the irrigation season is to charge (fill) the system by using all three pumps They then operate with one pump for a month, start the second pump during the second month, and finally start the third pump at about three months

Alternate Gravity Water Supply

It is further recommend that a "Desk-top Study" (pre-feasibility type that collects existing information and studies) be made in order to look at the alternative of developing a gravity supply to eliminate the high present cost of pumping If the yearly cost of electric is 2,500,000 Colones then (2,500,000 x 50 (years) = 125,000,000 Colones would be the cut-off cost for considering alternative gravity supply costs

The following points were made for technical justification for a gravity up-stream diversion Replacement of the Atiocoyo Norte original designed siphon is not practical at this time as there is not sufficient flows in the river at the point of diversion It has been estimated that an up-stream gravity diversion would cost 60 0 to 70 0 Mil and that would be an energy savings of 2 5 Mil per year Therefore, in 24 to 28 years, the energy savings would equal the initial construction cost

Further technical and economic studies need to be completed immediately in order to evaluate
a) payment of electrical energy during peak hours,
b) replacement of pumps with either electric or diesel pumps, and
c) alternate up-stream gravity diversion.

5 0 ATIOCOYO SUR I&D DISTRICT

5 1 Proposed New WUA's Tariff Structure (February 13, 1999)

The following is an proposed new Water Users Association Tariff Structure budget for the year 1999 It includes the new line items discussed in this report

ANNUAL BUDGET - LINE ITEMS

1999 (year)

Income			Estimated Amount
Water Charges	1575 @ 200 per Ha		315,000
	Total Irrigatable Area	@	
	Area Irrigated	@	1,575
Equipment Rental			81 000
Services provided			28,000
Land Profit/income			
Other Income			
	Sub-Total		424,000
Contingence @ 15%	(Needed if WUA s have to Pay 13% GOES tax)		**63,600** (-47 229)
Total Income			487,600 (vs 534,829)

Expenditures	Items	WUA Cash Cost	WUA Contributed Labor	GOES Costs
1 0	Administration	**122,269**		
2 0	Annual O &M	**310,000**	**663,750**	**1,215,000**
2 1	Operations	48 000	144,000	
2 2	Maintenance	262,800	519,750	1,215,000
2 2 1	Irrigation system	103,200	519,750	485,000
2 2 2	Drainage system			170,000
2 2 3	Roadway system	30,000		560,000
2 2 4	Mobile Equipment	129,000		
3 0	New Construction	**32,000**		**68,000**
3 1	Measuring Structures	32,000		68 000
3 1 1	distribution system	20,000		48,000
3 1 2	on-farm	12 000		20,000
4 0	Investment Recovery &/or Replacements			
4 1	Civil Works			
4 2	Mechanical / Electrical Works			
4 3	Mobile Equipment			
5 0	Transitional Costs (5 year period)			
5 1	Training WUA -staff and Board of Directors			
5 2	Additional Technical Assistance			
Sub-total (1 - 5)		465,069	663,750	1 283,000
Contingencies (15% of sub-total)		69,760	99,563	192,450
Total Expenditures		**534,829**	**763,313**	**1,475,450**
Actual WUs Costs of water per Ha - cash cost 534 829 + contributed labor 763 313 equals 1,298,142				
Total Numbers of Irrigatable Ha.		1,575	1 575	1 575
Average WUs Cost of water per Ha		340	485	**937**
Cash costs 340 + contributed labor costs of 485 equals 825 /Ha				

The above estimated 1999 budget is based on the follow factors

Irrigated Area based on 1998/99 information equals 1,575 Ha

I&D System (in Kms)

Irrigation Canals Primary - 16 0 2nd - 30 7 nd - 3 6 = 50 3 total Kms
Drainage system (45 0 Ha & lengths in decree) = 21 9 total Kms
Roadways (lengths in decree) = 70 1 total Kms

Income

Income for Equipment rentals and Services provided from A-S - WUA

Contingence of 15% added to meet present legal requirement to pay 13% GOES Tax. The payment of this tax was not included in budget information provided, however the WUA's can petition GOES - Ministry of Treasury and Internal Revenue Service for an exemption to not pay same

Expenditures

The WUA cash cost numbers and contributed labor, except for New Construction of Measuring Structure was based on their present 1998/99 budget information that was provided

The GOES costs for Irrigation and Drainage System was based on a proration of the back log of critical deferred maintenance related to the length of the systems referred to above The Roadway maintenance by WUA is based on 30 small roadway repairs estimated a an average of 1,000 colones each The balance of the GOES cost for roadways is based on the 70 Kms of roads with maintenance by MOP/GOES at a frequency of 4 times per year at a average cost of 2,000 Colones per Km (4 x 2,000 x 70) = 560,000 Colones

Investment recovery &/or replacements #4 0 was not considered to be an WUA activity cost at this time

Transition Costs # 5 0 for WUA's training and additional technical assistance was not considered an WUA activity cost, at this time, as this immediate need can be covered from within present and proposed activities already and/or proposed Donor related funding, mainly Techno Serve

Summary

Atiocoyo - Sur with it high contributed labor cost factor presents a very favorable cost sharing for both with GOES and with it's water-users

Rehabilitation

The entire system reflects a level of O&M below the normal level for continued system sustain ability, resulting in either a backlog of deferred O&M and/or additional rehabilitation needs The need for rehabilitation is recognized by all concerned and GOES/MAG is presently investigating

and working toward securing a Donor loan

The irrigated area in Sur is 1704 Ha with about 1560 Ha presently being irrigated About 2/3 of the area is in pastures, 1/3 of the area is in rice, about 75 Ha is in corn, and 10 Ha is in watermelon The average landholding is 3 60 Ha in Atiocoyo Sur

The service area is divided into sections Water Users, during irrigation season, receive water on a delivery schedule every eight days, irrigating 24 hours per day with an estimated water delivery of sufficient water (est 25 l/s) to irrigate 1 manzans in 4 hours All water-users pay 140 Colones per Ha

There is a serious problem related to the lack of efficient on-farm irrigation practices One of the contributing factors in Atiocoyo is the lack of properly leveled irrigation fields This, coupled with the lack of accurate volummetric water measurement, has led to delivery of a high volume of water which in turn leads to higher volumes of waste or run-off waters, which in turn leads to noticeable soil erosion

Rice has a noted high crop water requirement, and not all soils (light and medium textured) are suitable for rice production

With the changes in original design and construction, the river diversion point, the water volummetric diversion rights, as well as the water quality, need to be clarified and protected

The original system design called for a gravity diversion of 1 5 l/s However, at the present time, water is being diverted during high river flow periods to between 2 2 to 2 5 l/s (3800) and almost all of the designed freeboard is being used In certain sections, they are operating over the top of the concrete lining

In the original design of the system and per the diversionary water rights, it is mandated to have volummetric measurements throughout the entire irrigation system

A system measurement device is recommended at each diversion point, within the distribution system, as well as at the on-farm delivery points

One of the best contributing factors that help keep the system operating is the dedication and practical experience of the Water Users Association staff.

There is a backlog of deferred system maintenance throughout the entire system, in addition to the rehabilitation needs previously stated

This District has very good WU contact with it's 482 Users and has developed a high rate of

As rehabilitation was made to the original design, with only minor modifications, the present Operation and Maintenance (O&M) status of the system can be evaluated

The sections/parts of the system that were not rehabilitated were - 54 65 kms of secondary canals and 6 6 kms of laterals plus 4 non-functional wells, 2 pumping stations, 9 4 + 35 5 kms of roads and 38 5 kms of drains, etc These system sections reflect a below normal level of O&M and this has resulted in either a backlog of deferred O&M and/or additional rehabilitation needs

From the backlog of deferred maintenance, the critical maintenance needs will have to be estimated and added to the revised annual maintenance costs Fifteen kms of secondary and lateral canals, 10 kms of roadways, and 10 kms of upper elevation drains and/or drainage crossings will be used for initial estimation purposes A calculation for replacement and/or rehabilitation cost will be added

There are 10 river diversion points and the water volummetric diversion rights need to be clarified and protected as well as the water quality checked at each diversion point This lack of clarification and checking has lead to some confusion in the reporting of flows, divisions, system losses and on-farm delivery amounts, e g , 1 6 l/s /ha - Designed System Flows, 1 8 m3/sec diverted except in Sector # 5 = 0 55m3/sec with 18 hours per day pumping On-farm Delivery Amounts = 25 - 30 l/s for 4 - 7 hours/Mz Crops Rice, corn, green pepper, cucumber

Operational High Electric Energy Costs

Operational electric costs discussions were held with the Electric Distribution Company CLESA Until the tariff is adjudicated related to the ability-to-pay, pumping operational procedures can be modified to start operations during the low hours (23 00 to 04 59) and finish before the high hours start at 18 00 hours resulting in cost savings up to 10%

Calculations for replacement and/or rehabilitation costs must be added to the budget

6 1 Proposed New WUA's Tariff Structure (February 13, 1999)

The following is a proposed new Water Users Association Tariff Structure budget for the year 1999 It includes the new line items discussed in this report

ANNUAL BUDGET - LINE ITEMS

1999 (year)

Income			Estimated Amount
Water Charges -			750,000
Total Irrigatable Area		@	3,200
Area Irrigated		@	3,000
Equipment Rental			160 000
Services provided			10,000
Land Profit/income			
Other Income			120,000
Sub-Total			1 040 000
Contingence @ 15%	(Needed if WUA s have to Pay 13% GOES tax)		**156,000**
Total Income			1 196,000

Expenditures		**WUA**		**GOES**
	Items	Cash Cost	- Contrib Labor	Costs
1 0	Administration	**217,308**		
2 0	Annual O &M	**839,028**	750,000	2 843 214
2 1	Operations	46,664	150,000	
2 1 a	Electrical Energy	***236,200***		***2,215,800***
2 2	Maintenance	556,164	600 000	717 414
2 2 1	Irrigation system	75,000	600,000	71 220
2 2 2	Drainage system			523,000
2 2 3	Roadway system	33,000	*(360,000)	* 123,194
2 2 4	Mobile Equipment	218 160		???
2 2 5	Pumping Equipment	230 004		???
3 0	New Construction	**64,000**		**136,000**
3 1	Measuring Structures	64,000		136,000
3 1 1	distribution system	40 000		96,000
3 1 2	on-farm	24 000		40,000
4 0	Investment Recovery &/or Replacements			
4 1	Civil Works			
4 2	Mechanical / Electrical Works			
4 3	Mobile Equipment			
5 0	Transitional Costs (5 year period)			
5 1	Training WUA -staff and Board of Directors			
5 2	Additional Technical Assistance			
Sub-total (1 - 5)		1 120 336	750 000	2 979,214
Contingencies (15% of sub-total)		168,050	112,500	446,882
Total Expenditures		**1,288,386**	**862,500**	**3,426,096**
*Actual WUs costs of water per Ha - cash cost 1 288 386 + contributed labor 862 500 equals **2,150,866***				
Total Numbers of Irrigatable Ha		3 000	3 000	3,000
Average Cost per Ha		429	288	1,142
*Cash costs 429 + contributed labor cost 288 equals **717/Ha***				

The above estimated 1999 budget is based on the follow factors

Irrigated Area based on 1998/99 information equals 3,000 Ha
I&D System (in Kms)
Irrigation Canals Primary - 12 7 , 2nd - 54 65 , 3rd - 6 6 = 73 95 total Kms
Drainage system (Main - 27 5 + 38 5 in rivers & valleys) = 66 0 total Kms
Roadways (Main 9 4 + 35 5 2nd) = 44 9 total Kms

Income

Income for Equipment rentals and Services provided from Zapotitan - WUA information

Contingence of 15% added to meet present legal requirement to pay 13% GOES Tax. The payment of this tax was not included in budget information provided, however the WUA's can petition GOES - Ministry of Treasury and Internal Revenue Service for an exemption to not pay same

Expenditures

The WUA cash cost numbers and contributed labor, except for New Construction of Measuring Structure was based on their present 1998/99 budget information that was provided

The GOES costs for Irrigation and Drainage System was based on a proration of the back log of critical deferred maintenance related to the length of the systems referred to above There is a great emphasis this year on the Drainage system, especially in the upper sections, due in part to the backlog of critical deferred maintenance The Roadway maintenance by WUA is based on 33 small roadway repairs estimated a an average of 1,000 colones each. The balance of the GOES cost for roadways is based on the 45 Kms of roads with maintenance by MOP/GOES at a frequency of 4 times per year at a average cost of 2,000 Colones per Km (4 x 2,000 x 45) = 360,000 Colones However, in their 1998/99 budget the Zapotitan-WUA used a lower number 123,194 Colones than the number estimated above of 360,000 Colones The difference in these two numbers needs to be clarified

There are no costs allocated to GOES for major repairs and replacements for mobile equipment and pumping equipment

Investment recovery &/or replacements #4 0 was not considered to be an WUA activity cost at this time

Transition Costs # 5 0 for WUA's training and additional technical assistance was not considered an WUA activity cost, at this time, as this immediate need can be covered from within present and proposed activities already and/or proposed Donor related funding, mainly Techno Serve

Summary

Zapotitan has no technical ability to replace present pumping (Stations & Wells) with an up-stream gravity diversion Therefore, it will always have high O&M costs related to pumping

6.2 Recommendations (Previous Report)

The recommendations in the previous report are still valid.

Sector #5 and perhaps the balance of the gravity service areas should be at a gravity tariff rate (set volummetric block amount, perhaps related to size of Land holdings)

The pumped areas and the well service areas should be at rates to cover electrical energy costs If and when exact areas and energy cost can be determined, it may then be desirable to set elevation service areas A simplified form of estimated volummetric block flow is recommended until measurement structures are sufficiently in place to provide accurate volummetric measurements

All general report recommendations should be implemented over-time to the extent economically feasible.

Conclusion

When all actual costs (ie equipment) per the present legal "Transfer Agreement' are accurately incorporated into the present tariff structure, an evaluation related to transfer can be more realistically made

When the ability of the water-users in Sector #5 and perhaps most of those in the balance of the gravity served area are recognized by a separate tariff as previous recommend above This raises serious concern related to the ability and willingness of the water-users/farmers in the district to pay

At this present time there is not, ready available, sufficient economic/cost data to evaluate the transferring of this I&D District for a period of 50 years

When sufficient data is available and there is, at the least, a practical and acceptable implementation plan for same We can assist in the re-evaluation of transferring this I&D District

7 0 LEMPA - ACAHUAPA I&D DISTRICT

Background

During the long construction period (1991/93 start) the system reflects a below normal level of O&M for continued system sustain ability This has resulted in a backlog of deferred O&M during the construction period.

The designed irrigated area is for 2511 Ha In 1997/98 about 1,000 Ha were cropped, 600 Ha being irrigated and 400 Ha in sugar cane (no water service)

The average landholding is 5 4 Ha with 4 Cooperatives The distribution is

a) 1 to 3 0 Ha = 1026 Ha,
b) 3 1 to 25 Ha = 441 Ha, and
c) more than 25 Ha = 721 Ha

The service area is divided into 53 Units for control and record keeping, with 20 units in Sector #1, 13 units in Sector #2 and 20 units in Sector #3

Water Users, during the irrigation season, receive water on a delivery schedule of 18 hours per day, Monday through Saturday and only irrigate during daylight hours

In 1997/98 Water-users pay **500 Colones per Ha/Yr + 13% tax** In addition, they pay **a one time subscription fee of 100 Colones per User and a social activities fee of 50 colones per User per year** The I&D District is providing land leveling services, estimated at average of 200 m3/Ha or 2,500 Colones per Ha. average cost It also provides land preparation services at

a) plowing @ 300 per mz,
b) disking @ 130 per mz, and
c) sowing @ 120 per mz

plus 13% tax

Water charges and land preparation charges all go into a special Lempa Acahuapa District fund

The original system design called for a gravity diversion of 5 0 m3/sec , with 2 1 m3/sec for the Right Canal and 2 9 m3/sec for the Left Canal The irrigation system was designed for a distribution efficiency of 63% and an on-farm irrigation efficiency of 40%

In the original design of the system and per the diversionary water rights, it is mandated to have volummetric measurements throughout the entire irrigation system

As of June 1998 there were 26 of 56 measuring structures within the distribution system at this time The present design calls for a partial flume measuring device down to the start of each unit (which averages about 50 Ha) System measurement devices are recommended to be installed to a average of at least 20 Ha and preferably to 10 Ha

There is the backlog of deferred system maintenance throughout the entire system, especially that part of the irrigation system that is built on **elevated levies - 7.34 kms/ 20.9 Ha**

The drainage system is basically the natural basin terrain and the drainage water flows into seasonal streams and natural rivers As such, the maintenance is definitely 'low-cost' However, when the I&D system was originally installed, it had to be constructed across this naturally contoured drainage systems As a result, all along the irrigation and roadway systems there are parallel drains and natural drainage crossings that must be maintained in order to protect the systems

An additional problem is the lack of control of irrigation water and in some cases rainfall, as it enters into the upper portions of the drainage system High soil erosion in this area is noticeable, due to lack of adequate soil conservation practices

Present Status - February 13, 1999

During Hurricane Mitch, 8 kms of canals were damaged by various sections of the left canal falling into the river, at 8 300 and Canal 12 2-3 8 as well as the small siphon crossing Rio Acahuapa Lempa 3 at 10+200 was also damaged

Repairs are underway for the small siphon and MAG plan to repair the canals when monies are available under GOES emergence funding As a result the service areas below these damaged section are not serviceable at this time

In the previous report and in the Background section above, concern is raised about the "backlog of deferred system maintenance throughout the entire system, especially that part of the irrigation system that is built on **elevated levies - 7.34 kms/ 20.9 Ha** "

Parts of the secondary canal system and about 60% of the Land leveling is still not completed In July 1998 a re-evaluation of the I&D system indicated that the total area was now 1867 61 Ha (rather than the 2,511 Ha with 2,196 Land Owners previously reporting) with a net irrigateable area of 1488 75 The total area to be land leveled is 1193 43 of which only 490 74 have been leveled It is understood that the IDB loan funds have all been expended

The present area under irrigation is estimated to be only 300 Mz , with a water charge of 395 50 per Mz, this would recover only 118,650 Colones if all paid

7.1 Recommendations

It is recommended that MAG/GOES proceed to secure emergence funds to make the necessary emergence repair as soon as possible

It is further recommended that the backlog of deferred maintenance during construction be picked up by a set program for same Rules & Regulations should be adopted so as to prevent encroachment and breaking of canal linings for washing cloths, etc

If the designed on-farm irrigation efficiency of 40% is achieved and the lack of on-farm volummetric water measurement is corrected by installing measuring devices below the present unit level (average of 50 Ha) to 20 Ha average, this would be quite an acceptable starting point

APPENDIX A

CONSULTANTS TERMS OF REFERENCE / SCOPE of WORK

APPENDIX A - Consultants Scope of Work

Date September 10, 1998

CRECER PROJECT
Rural Equitable Economic Growth Project
San Salvador, El Salvador

TERMS OF REFERENCE

I. Assigned Number

Short term consultant for the evaluation of and decision about tariffs for the operation and maintenance of the irrigation districts currently under the administration of producers organized into water user associations Second trip, provided recommended activities have been accomplish by water user associations

II Proposed Candidate

Mr Jack Farmer, who fulfill the candidate requirements An irrigation specialist with international experience in advising about private management of irrigation districts and institution building of self governing water user associations Has working experience in Latin American countries

III. Background

There are four major irrigation districts in El Salvador, Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan The Lempa-Acahuapa, despite its financing by the Inter-American Development Bank, has not been finished but is operating in the extent possible The other districts are completed and functioning A grant form the Japanese government of about US$6 million will finance the complete rehabilitation of the Zapotitan district The rehabilitation project for Atiocoyo Norte has been approved by the government but funds are yet to be allocated The Atiocoyo Sur is operating without major difficulties, although it needs also some rehabilitation works

Up to about 1990-1991, the districts were entirely managed by the Irrigation Division of the General Directorate of Natural Resources, a branch within the Ministry of Agriculture, which meant personnel, logistics, and minor repair expenses covered by public funds From this date on and motivated by a change in the government policy, MAG gradually reduced its support to the operation and maintenance of the districts leaving the payment of the required expenses to the water user associations organized for this purpose, and tacitly transferring the administration of the districts to the private sector Currently, the personnel assigned to the districts is

minimum and government financing has reduced to payments of the energy used to pump water from the derivations and some wells inside the districts This latter payment refers specifically to the Atiocoyo Norte and Zapotitan districts

During the time MAG was covering the majority of the operating and maintenance expenses (O&M), the tariff determined for this purpose and the tariff to cover the amortization of investment were in arrears and the debt accumulated to some million colones The actual figure in yet undetermined since 1) the unit in charge of collecting the tariffs lost control of the records, 2) ownership of the land and parcels has changed hands a number of times, and 3) in some cases, there was not a tariff set for O&M and investments recovery In any case, the amount mentioned by the Irrigation Division is at least questioned by the actual land tenants and members of the water user associations Since the time the associations have undertaken the responsibility to manage the use of the irrigation districts, the O&M expenses have been paid by the users, except for the energy costs in the Atiocoyo Norte and Zapotitan cases

The current Minister of Agriculture has decided to officially transfer the administration (i e , the O&M) of the districts to their associations, including the channel, road, and installation systems, buildings and other permanent facilities The machinery assigned to each district will be evaluated either to discard the unusable pieces or to publicly auction them, granting some privileges to the associations in the process (The law restricts the government from donating its goods to the private sector)

Among the points of the transfer negotiation, an important issue is the payment of the overdue tariffs, as well as a gradual reduction of the energy payment by MAG The proposal of the associations is for MAG to condone entirely the debt, upon the argument that, even without an official transfer, the associations have covered the O&M expenses and have saved resources to the government MAG's position is one of expectation the Minister would like to have an evaluation of the amounts involved before taking a decision on this issue

Given the financial problems the associations have faced and will face in the near future, especially if they have to cover all O&M expenses, including energy, and eventually some investment costs, they have requested technical assistance to evaluate the expenses already covered vis a vis the debt due to unpaid tariffs, and to determine the appropriate tariff to easily cover the O&M and other contingent expenses

IV Objective

The main objective of these terms of reference is to precisely evaluate the value of the O&M expenses covered by the associations vis a vis the amount MAG claims as overdue tariffs plus interests, and to assist the associations to set the right tariffs for O&M and, eventually, for covering a proportion of the investment cost, which is another point of negotiation. A parallel objective is to train the leaders of the water user associations in the elemental techniques of setting tariffs and implementing a simple but efficient recovery and record keeping system Still

another side objective is to appraise the current water metering system used by the associations and present recommendations on how to improve it

V Scope of Work and Activities

The consultant will assist MAG and water users in the following activities

1 01 High electrical energy cost Assist with the finalization of acceptable subsidy

1 02 Heavy mobile equipment major repair and replacement costs (1) Investigate and assess the possibility of transferring all not-needed equipment to the Ministry of Public Works for use in their rural roads program for their maintaining Irrigation and Drainage Districts roads on a set schedule, (2) Investigate and assess the possibility of GOES providing the remaining O&M equipment needed, (3) Assist in the development of an acceptable subsidy percentage solution for major repairs and replacements, (4) Compare and evaluate the need for the construction equipment presently available for transfer to O&m uses, to that of the actual equipment needed.

1 03 Review and evaluate draft budgets prepared by the four I&D Districts using the report recommended formats, and comment on "ability to pay" proposed new water rates

VI. Time Required

It is estimated a period of 4 to 6 person-weeks of work to complete the suggested activities and to reach the objectives of these terms of reference

VII. Estimated Dates and Location

Provided the recommended activities are completed by the four I&D Districts, the estimated date to initiate this second trip is October 5, 1998 The consultant will be located in San Salvador and arrangements will be made to take him to the district sites as often as needed

VIII. Technical Coordinator

The technical coordinator will be Hugo H Ramos, the Agricultural Policy Advisor of Crecer

IX Expected Outputs

These are the concrete products expected from the consultant

1 01 Proposed O&M budgets for the four major I&D Districts

1 02 A recommendation memorandum on the appropriate sharing of the major repairs, replacements and rehabilitation works between GOES and the water users

1 03 Assist water users to set up a water metering and distribution system that would be inexpensive and easy to use

1 04 In service training of the association leaders on the main aspects of the scope of work, especially on setting the tariffs and the O&M annual budgets

1 05 A memorandum identifying future technical assistance needs for the associations

One of the main results of this technical assistance will be to support the Minister and associations in finalizing the district transferring negotiations, and to strengthen these other type of rural enterprises

APPENDIX B

CONSULTANTS ACTIVITY SCHEDULE

B - Consultants Activity Schedule
ACTIVITY SCHEDULE - JACK FARMER - January 24 to February 15, 1999 (1/30/99)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Jan. 24 Travel to El Salvador	25 CRECER TNS w/Hugo	26 Zapotitan w/TNS am - staff pm-Board	27 CRECER briefings	28 Transfer Committee @ TNS w/ Cecilia & Attorney	29 Atiocoyo Norte w/TNS & Cecilia	30 CRECER writting
Jan 31 day-off	Feb 1 10-TNS w/ Hugo 14-TNS w/ Cecilia	2 Zapotitan w/TNS	3 Atiocoyo Sur w/TNS & Cecilia	4 Transfer Committee @ MAG ? w/ Cecilia	5 Lempa - Acahuapa w/TNS & Cecilia	6 CRECER Finalize Energy & Mobile Equipmen t cost sharing
7 Day-off Finalize Justications - Related to A-Norte Operations & costs	8 Finalize Recomd's on Road maint by MPW & GOES providing O&N Equip needed	9 Finalize Recoms & Justifications -on Water measurements(metering) Canals & Turn-outs	10 Finalize Recoms & Justifications -on WUA's training & TA needs	11 CRECER prepare Semi- draft Report	12 CRECER Writting Report Presentati on to A-N &A-S MAG/ staff	13 CRECER writting Report
14 Jack - departs El - Salvador	Feb 15					

APPENDIX: C

LIST OF MEETINGS &

CONTACT PERSONNEL

APPENDIX C - LIST OF MEETINGS and CONTACT PERSONNEL

1/24/99	-18 00	- Travel to El Salvador - Jack Earl Farmer (JEF)
1/25/99	-06 20	- arrival at San Salvador (S S) airport
	-08 30	- arrival at El Savador hotel
	-09 30 - 11,30	- Met with Hugo Ramos (HR), CRECER Coordinator and Richard Clark(RC), CRECER COP Re discussion of SOW
	-14 00 - 15 30	- Met with Ing Alirio Edmundo Mendoza (AEM), Coordinator Irrigation Projects TechnoServe (TNS) @ TNS w/ HR
	-15 45	- Returned to CRECER
1/26/99	-06 40	- Departed CRECER for TNS office
	-07 00	- Attended meeting @ TNS w/ AEM and staff Rutilio Mena (RM), Agr Eng , for travel to Zapotitan (Zap) I&D
	-10 30 - 13 00	- Met with Zap Staff & TNS on updates & budget estimation methods
	-14 00 - 17 00	- Attended Zap Board of director's meeting and gave briefing on morning discussion points
	-17 00	- Departed Zap for S S
	-18 00	- arrived CRECER office
	-18 05	- had CRECER driver pick-up diskette from TNS to bring back to me at CRECER - received diskette
	-19 00	- left CRECER office for hotel
1/27/99	-08 00	- CRECER
	-09 00	- Interviewed Cecilia de Lievano (CL) for position of Interpreter - Discussions related to work activities
	-14 00 - 17 30	- Met with Hugo and Cecilia and Myrian Esther Sorto (MES), CRECER Attorney
	-18 00	- left CRECER office for hotel
1/28/99	-08 00	- CRECER
	-08 40	- left for TNS with Cecilia (CL)
	-09 00	- met with Ing A Mendoza (AEM) discussion of points on Transfer conditions
	-10 00	- attended Transfer Commitee Meeting with CL and MES
	-16 00	- departed Tns w/ MES & CL for CRECER
	-16 20 - 17 00	- Briefing with Hugo (HR) and MES & CL
	-18 00	- left CRECER office for hotel

1/29/99	-06 40 - 07 00	-departed hotel with Cecilia (CL) for TNS office
	-07 00	- met with Ing A Mendoza at TNS office and departed for Atiocoyo Norte (A-N)
	-09 30 - 12 00	- attended CENTA & TNS meeting on coordindation of activities at Atiocoyo Norte
	-13 00 - 15 00	- met with A-N President & A-N staff and TNS staff discussions on electrical service and pumping and system operations
	-15 00 - 16 45	- travel A-N to S S
	-16 45 - 17 00	- brief coordination discussion with Hugo (HR), CL at CRECER
	-18 00	- departed CRECER for hotel
1/30/99	-08 00	- CRECER - report organization and writting
	-18 00	-departed CRECER for hotel
1/31/099	Sunday	-Day-off
2/1/99	-08 00	-CRECER
	-10,00	- Meeting at TNS w/ AEM &HR- coordination
	-11 30	-returned to CRECER
	-14 00	-jointed by CL
	-18 00	-departed CRECER for hotel
2/2/99	-08 00	- Travel to Zapotitan w/ TNS for discussions w/ staff - attended coordination meeting Zap , TNS & CENTA - discussions w/ staff Re Budget
	-18 00	- returned to San Salvador
2/3/99	-07 30	-departed hotel w/CL & TNS for Atiocoyo -Sur
	-10 00	-meeting w/ A-S & TNS staff - Re Budget- A-S
	-18 30	- returned to San Salvador and hotel
2/4/99	-08 00	-CRECER
	-10 00	- meeting at TNS w/CL & AEM - budget analysis and discussions
	-17 30	- left TNS for CRECER
	-18 30	- left for hotel
2/5/99	-07 30	- departed hotel w/ CL TNS for Lempa-Achaupa
	-09 30	- meet w/ Staff & two members of Board (See attendance sheet)
	- 14 30	- returned to TNS office
	-17 30	-departed TNS for hotel
	-18 30	- left CRECER office

2/6/99	-08 00	- CRECER office - report writting
	-10 00	- to TNS w/CL Re Budgets and cost sharing
	-16 30	- left TNS office
	-18 00	- departed CRECER office
2/7/99	Sunday	- Day-off
2/8/99	-08 00	- CRECER
	-10 30	- left for MAG/ Natural Resources w/CL
	-12 00	- meet w/ Ing Juaquin Flores and then w/ Ing Carlos Armando Gutierres Jule and Miguel Augel Guerra Mancia , L-A
	-15 00	- left for CRECER
	-18 30	- departed for hotel
2/9/99	-08 00	- CRECER
		- Budget reviews
	-14 00	- meeting at TNS w/CL - Revised budgets
	-18 30	- departed for hotel
2/10/99	-08 00	- CRECER
		- worked on report
		- jointed by CL
	-15 30 - 16 30	- meet w/ Sebastien Lentz of Constru Market Re equipment costs
	-18 30	- departed for hotel
2/11/99	-08 00	- CRECER
		- work on report reversions and clarifications
		- jointed by CL
		- prepared for presentations on 2/12/99
	-18 00	- left for hotel
2/12/99	-08 00	-CRECER
	-10 00	- left w/ HR and CL for meeting at TNS w/ Atiocoyo- Sur and Atiocoyo-Norte -Transfer Committee members and AEM
	-12 30	- returned to CRCER
	-14 00	- depart for meeting at MAG w/ HR & CL
	-14 30	- meeting with Ing Edwin M Aragon, Director OAPA/MAG
	-15 00	- Ing Alejandro Flores Bonila, Chief of I&D-MAG
	-15 30	- departed for CRECER
	-16 00	- left for CRECER for supplies
	-17 00	- return to hotel

2/13/99	-08 00	- CRECER
	-12 00	- jointed by CL assisting in locating supplies
	-13 00	- Lunch meeting debriefing w/ AEM at hotel
	-14 00	- returned to CRECER w/ CL
		- finalization of report
2/14/99	-06 00	- departed hotel for San Salvador Airport - Travel to USA
	-07 00	- arrived San Salvador Airport for Los Angeles airport
	-09 00	- departed San Salvador Airport for Los Angeles airport
	-12 30	- arrive Los Angles Airport
	-13 55	- depart Los Angeles airport for Monterey airport
	-15 30	- arrive Monterey airport
	-16 00 - 16 30	- arrive back in Carmel

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APPENDIX. D

LIST OF REFERENCES

APPENDIX D - LIST OF REFERENCES

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- Generally confirmed the need for WUA's and expanded agriculture within El Salvador

2) Proposed World Bank paper on El Salvador - Public Sector Modernization Project, March 1996
- Proposed a El Salvador project for public sector modernization through technical assistance loan, with private sector participation
- Query if loan & project finalized

3) Marco De Referencia Para La Formalacion De una Politica Nacional De Recursos Hidricos En El Salvador - Informe Primero por Enrique Aguilar Amilpo, Consultor Internacional - ORGANIZACION DE LAS Naciones unides para Agricultura y la Alimentacion (FAO) Roma - Mayo 1996, - programa de cooperacion Tecnica - TCP/RLA/4557
Query status of program

4) Irrigation System Management Transfer (ISMT) and Water Users Association in Aticocoyo (Sur) Irrigation District, El Salvador - TECHNICAL EVALUATION REPORT - September, 1996, by L Humberto Yap-Salinas, Ph D , Director International Irrigation Center, - Department of Biological and Irrigation Engineering, Utah State University
- page 36, comment TechnoServe efforts should continue and be expanded to include
    1) A detailed inventory, or profile of a) physical conditions and of b) farmers
    2) promotion of land leveling
    3) continue efforts to work with the government
    4) page 38 -

5) Comision Ejecutive Hidroelectrica del Riom Lempa -CEL
- Propuestas para el Pago de Servicos de Energia Electrica y Manejo de Demanda en el Distrito de Riego del MAG Atiocoyo Norte
- Gerencia de Planificacion y Estudias - Febrero de 1998

- page 17

6) Proyecto de Desarrollo Agricola del Valle de Zapotitan - Volumen IV -Plans -TAHAL Consulting Engineers Ltd , Tel Aviv - Julio 1970

7) Distrito de Riego y Avenamiento No 2 ATIOCOYO - Asesoria ICATEC, SA - Julio 19973 & Julio 1974

8) Evaluaion Critica del Proyecto de Desarrollo Agricola Lempa-Acahuapa El Salvador - Boris E Bravo-Ureta y Alirio E Mendoza, TechnoServe - Diciemre 15, 1997

9) Propuesta de Transferencia de los Distritos de Riego - Federacion de Asociaciones de Regantes de El Salvador - Agosto de 1996

10) El Salvador - proyecto de Riego Atiocoyo Pn 85 2298 9 Mision de Apoyo en Operacion y Mantenimiento - Agosto, 1992 - GFA-Gesellschaft Fur Agrarprojekte M B H. With separate Anexo (#1 through #50

11) Cooperacion Salvadorena - Alemana Fomento de la Agricultura de Regado y de los Servicios en el Area de Atiocoyo Estructuracion del Presuepuesto de la Asociacion de Regantes del Sector Sur del Distrito de Riego de Atiocoyo -GTZ- MAG-GFA - Abril 1993

12) Regamento Interno dela Asociacion de Regantes del Sector de Atiocoyo San Isidro Distrito de Rirgo y Avenamiento No 2 - TechnoServe , -Julio de 1996

13) Rules and Regulations of Central California Irrigation District - 1990 With two page letter - 1998 Water Rates and Allocations, - March 4, 1998

14) Impacto Ambiental del Proyecto Hidroelectrico El Cimarron - CESTA Centro Salvadoreno de Tecnologia Apropiada

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16) Measuring Irrigation Water, University of California Davis -1981 (leaflet #2956)

17) Surface Irrigation, University of California, Davis -1995 (Handbook)

18) Water Policy and Water Markets, - 1992, World Bank Technical Paper No 249

19) Evaluation of El Salvador's Four Major Irrigation Districts - Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan - Administration as Water User Associations - Final Report - July 31,1998

APPENDIX E

EVALUATION OF EL SALVADOR'S FOUR MAJOR IRRIGATION DISTRICTS FINAL REPORT - JULY 31. 1998

EXECUTIVE SUMMARY

APPENDIX - E.

EVALUATION OF EL SALVADOR'S FOUR MAJOR IRRIGATION DISTRICTS
FINAL REPORT - JULY 31. 1998

EXECUTIVE SUMMARY

PRESENT STATUS

At present a "Transfer Committee" composed of both Government of El Salvador (GOES)/Ministry of Agriculture (MAG) and Water Users Associations's (WUA) personnel meet almost weekly in order to facilitate the preparation of a legal agreement to transfer the administration of Irrigation and Drainage Districts (I&Ds) from GOES/MAG to the WUAs Various points have been discussed and some documented points agreed to in principal Other activities have been completed and/or are underway

A draft legal document has been prepared and needs to be finalized. This would allow transfer of ID administrative responsibility to the WUAs for a fifty year concession period The initial four IDs to be transferred are Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan The three older irrigation districts are to have their main systems (canals, drains and roadways, etc) rehabilitated by the GOES to the extent that donor assistance funding is available

New legislation now being drafted would form a Federation of WUAs and would include the four major Irrigation Districts, Atiocoyo Norte, Atiocoyo Sur, Lempa-Acahuapa, and Zapotitan The Federation would assist farmers through the WUAs in the purchase of inputs (seeds, fertilizers etc) and commercialization (marketing/finance, etc) activities

One of the main results of this technical assistance activity (Output) will be to support the Minister and associations in finalizing the district transferring negotiations, and to strengthen other type of rural enterprises.

FINANCIAL AND ECONOMIC EVALUATION

At present the four IDs/WUAs are assessing and collecting an "out-of-pocket' amount as water charges These vary from district to district The present financial and economic conditions are difficult, as the I&D-WUAs have no legal means to enforce collect of payments until the administrative right is transferred

An official decision on condonation of the investment debts (or at least a set percentage), and the outstanding O&M debts and power bills (and/or a set percentage of energy costs over a set time period) greatly affects any proposed tariff structures, as well as affects the evaluation of the economic implications and impacts on the sustain ability of the producers in the irrigation districts An analysis is to be made (as soon as data is available) of the amount of funds due to MAG as unpaid O&M and the investment cost recovery tariffs **The length of the transfer period has to be determined as well as the annual subsidy percentage amounts over time.**

THE I&D DISTRICTS ADMINISTRATIVE TRANSFER STATUS

There is no question about the desirability and the need to transfer the administration of the four I&D Districts from the GOES to the WUAs This administrative transfer would be advantageous to the GOES, who would be relieved of the responsible for the cost of the administration of the four I&D Districts, and the Water Users, who would benefit from the lower administrative costs of the private sector salaries and benefits

Leaving the social/economic and political issues aside and looking at the administrative cost issue in simple terms, the main administrative savings is in the difference in administrative personnel costs of GOES compared to WUAs By transferring the administration of the four I&D Districts, the GOES would realize an annual savings of 900,000 x 4 (districts), or 3,600,000 Colones The total estimated WUs cost savings for the four I&Ds per year would be 1,200,000 Colones an **average of 134 60 Colones per Ha.**

However, all of these cost issues are over shadowed by the ability of the land owners to pay This is especially true of the smaller land owners (1-3 Ha) who are usually at only a bare subsistence level.

EVALUATION OF INVESTMENT (CAPITAL) COSTS REPAYMENTS

The following is the information presently available on investment (capital) costs for each of the four Irrigation and Drainage Districts to be transferred by GOES to the WUAs

Zapotitan original construction 1969/71 at 13 0 million Colones (GOES funds)
partial rehabilitation 1996/98 at $12 0 million (Donor-Japan)
(main canal, 15 wells, 3 pumping stations, etc)
irrigated area = 3,500 Ha
original cost = 3,714 28 Colones per Ha
rehabilitation cost = 29,828 57
total cost = 33,542.85 Colones per Ha

Atiocoyo Norte original cost 1975-78/79 IDB - $8 0 million & GOES - $7 9 million
irrigated area = 1,200 Ha - Norte (both Norte & Sur together)
= 1,704 Ha - Sur
total area = 2,904 Ha
cost = IDB = 23,966 94 Colones per Ha
\+ GOES = 23,667 36
total cost = 47,634.30 Colones per Ha

Atiocoyo Sur original cost 1975-78/79 IDB - $8 0 million & GOES - $7 9 million
irrigated area = 1,200 Ha - Norte (both Norte & Sur together)
= 1,704 Ha - Sur
total area = 2,904 Ha

cost = IDB = 23,966 94 Colones per Ha
+ GOES = 23,667 36
total cost = 47,634 30 Colones per Ha

Lempa Acahuapa designed 1985/86, major construction started 1991/93 estimated at 70% completed in July 1998
- IDB loan = $10 9 million + $6 1 million GOES = $17 0 million

irrigated area = 2,511 Ha
- IDB = 37,765 83 Colones per Ha
- GOES = 21,135 00 (GOES) Colones per Ha

total cost = 58,900 83 Colones per Ha

Notes (1) This includes an average cost of 2 500 Colones per Ha for land leveling
(2) The IDB loan is for 40 years @ 1 percent for the first ten years and 2 percent for the 30 year balance

PHYSICAL ASSETS OF WUAs

The original decrees forming the I&D districts define the physical assets, irrigation system, drainage system, and roadways by nomenclature A, B, C, & 1, 2, 3, etc , and by lengths (Kms), widths (mts), and area (Ha), in addition to buildings, pumps, and wells, etc related to the original design layout Over the years the systems have been changed Therefore, an accurate system inventory for each separate I&D District needs to be made and verified by GOES and WUAs

It is advisable to transfer the administration of the original I&D District decrees, as to lengths, widths, and areas but require the WUAs to operate and maintain only the present actual useable lengths, widths and areas Buildings, Structures and Stationary Equipment should be transferred in a similar format as that of the physical assets

MOBILE EQUIPMENT

An accurate up-to-date inventory should be made that includes the make, model, year (age), and present condition These inventories can then be compared to needs and costs for further discussions At the minimum, all non-usable equipment should be returned to the GOES for disposal and/or salvage A transfer memorandum can be developed based on transfer methodology needs and an understanding of cost responsibility, etc

In order to properly evaluate the equipment, under the present conditions, the following actions need to be taken

- Prepare equipment inventory lists per format already developed (Section 2 2 2)
- Secure original equipment costs and/or present replacement costs
- Add the information concerning 'average number of workdays used per year' to the equipment list

- Compare and evaluate the need for the construction equipment presently available for transfer to O&M uses, to that of the actual equipment needed.
- Check on possible equipment exchanges with the Ministry of Public Works

WATER DISTRICT SYSTEMS

Information/data sheets were developed for each project and data was collected from each of the four irrigation districts The information and data secured from this survey are given in Sections 4 through 8 of this report

The following issues and/or constraints related to the transfer of the four I&D Districts in the preliminary evaluation have been identified

Water Rights

In order to assure the capability to supply the designed flows, the administrative use of the diversionary water rights also needs to be transferred.

Water Measurements

The rapid appraisal of each district's ability to equitably distribute water indicates that El Salvador's laws and legal responsibilities clearly imply, from the volumetric division point (water right) that initial measurement is mandated by the I&D designed water service (liters per second per hectare) Further measurement structures should be constructed within the distribution system and each individual on-farm outlet so as to assure equitable water distribution

The Value of Irrigation Water

Usually there is a value put on water, 1) at the point of diversion (water right value) or, 2) a cost so as to protect the water diversion volume and quality The water cost value of 2) could be equal to the GOES cost for I&D district systems monitoring which is presently estimated to be 100 to 200 Colones per Ha Overall, the high cost differential between present charges and sustainable levels of the I&D Districts indicates that a cost phasing system over a initial five year period is more realistic The standard percentages per year are usually set at 15%, 25%, 25%, and 25%, with an allowance of 10% for slippages over time to be picked up in the last year

High Electric Energy Costs

Recently the El Salvador electrical energy sector was privatized This resulting in the formation of five electrical distribution service companies with set service areas CLESA is the electrical service company for service to Zapotitan I&D, and DEL SUR is the service company for Atiocoyo Norte I&D Electrical distribution companies buy power from various suppliers and then distribute/transmit energy to their areas electrical consumers/users Distribution companies add their transmission and administrative costs plus a 10% profit to the initial supply cost

The charge for Medium Demand Energy of more that 10 kw and less than 50 kw is
a) 9 68 Colones per month for commercialization and 64 63 Colones per kw/month for distribution, with hourly energy rates per kwh of 0 847 Colones for High,
b) 0 196 Colones per kwh for Low, and
c) 0 658 Colones per kwh for Remaining Hours

Irrigation Water Tariff Structures

The normal development procedure for irrigation tariff structures would be to develop the costs of annual operations and maintenance and other long term (20 year period) costs for investment cost recovery, additional new construction, rehabilitation, major equipment repairs and replacements, training, additional technical assistance and other special items These cost would then be prorated over the 20 year period as annual expenses

To facilitate planning and budgeting for irrigation water charges, the Detailed Planning Expenses Budget format and a Summary Major Line-Item Budget format (Section 2 5 4) have been developed Once the initial detailed planning expense budget is developed, the estimated expenditures have to be balanced against income Most of the income would be in the form of water service charges However, all true I&D District income must be shown, e g , rental of equipment, and production profits off of District lands, etc All non I&D income and expenditures(land preparation and harvesting etc) must be separated

Further balancing between income and expenditures is required related to at least two other major factors, (1) the true ability of the Water Users/Farmers to pay any increase, and (2) the present water rate charge Normally, any increase of over 15% will not be accepted without 70 to 85% of the WUs knowing and agreeing to any higher amount

Rapid Appraisal of WUA's Leaders Training Needs

At present there appears to be an immediate need for at least the following

- Planning and awareness of laws and other legal requirements
- Budgeting, accounting, and monitoring and evaluation procedures and practices
- Improved communications and public relations

One of the first initial TA activities needed is to develop a standard set of Rules and Regulations (R&Rs) for the I&D Districts

GENERAL SUMMARY AND RECOMMENDATIONS

All known major issues and constrains have been identified The present situation/status has been evaluated against the desired or required level for sustain ability The resulting recommendations are based on findings, observations and discussions, and take into consideration the different aspects of economic, social and political situations effecting each issue and/or constraint

With the basic initial differences in the positions of the Water Users and the GOES, it was apparent that the **NO-ACTION (status quo) scenario** would have to be evaluated. The preliminary evaluation of this scenario reflects a minimum loss over a 15 to 20 year period to both parties **GOES loss of $25 0 +/- million dollars and Water Users in the range of $9 0 to $18 0 +/- million dollars** Most of this loss is in land values and reduced production due to the farmers returning to rain-fed agriculture

Negotiations on the transfer of the I&D Districts must be continued in order to resolve all related issues and constrains Detailed recommendations are listed in Section 3 of this report The following are specific recommended actions that should be taken within the next 60 to 90 days

1 Agree on a legal transfer agreement/document

2 A "letter of agreement in principal" covering the following points must be developed and signed

- all items mutually agreeable, at this time
- define the GOES's already agreed to min imum points, as the starting points for further negotiations,
- agree on a time period to conclude further negotiations (September 15), and agree to either appoint an acceptable arbitrator, or arbitrators who's decisions (by 01 November) would be binding on both parties and/or ask for legal rulings that would be binding on both parties

3 During this 60-90 day period, develop detailed cost estimates for each subsidy activity as to cost sharing during transfer period so that GOES can secure approval and necessary funding in order to make payments to WUAs prior to actual need This would allow WUAs to develop detailed water charge tariff structures during the transfer period

4 Each I&D District should prepare the following within 30 days for review and evaluation, if necessary

a) detail physical inventories
b) detailed equipment list with following information -
Make - Model/Year - Condition - Original or Replacement Costs
c) draft planning I&D budget for July/August 1998 thru December 1999 (per forms in this report) and propose budgets for the next 4 / 5 years
d) draft separate planning budgets for all other activities per c) above

5 Items #4-a) and b) should then be attached to the transfer agreement for each separate I&D District

6 Each I&D district should adopt a set of I&D District Rules and Regulations

7 A Federation of Water Users Association should be legally formed and should undertake an information and public relations program related to present electrical energy tariff and other activities

8 Undertake the start of as many of the other recommendations as listed in Section 3

APPENDIX F

TECHNICAL INFORMATION AND DATA COLLECTED

January 24, to February 13, 1999

APPENDIX F

Technical Information and Data Collected (January 24 to February 13, 1999)

The following items of technical information and data collected are listed below and are located in the CRECER office along with the previous report information and data

As indicated in this report some of the information is needed by TNS, CRECER and others to complete technical and economic evaluation recommended in this report

We are also supply copy of the spread sheets developed in electronic copy (diskette) It is recommended that after finalization of the first year budget (1999) that cost sharing and projections be made for the first 10 to 20 years Further that by adding cell formulas to the spreadsheet they can be used as interactivity spreadsheets for projects, budgeting and accounting purposes

List of items

1 (1) Photocopy of DEL SUR S A de C V Historical Service for Atiocoyo Norte Pumps for 1998/99

2 (2 - sets of 4 pages each) from readings of Electrical Energy from DEL SUR for Atiocoyo Norte

3 (2 -sets of copies of 3 pages each) of Mobile and Office Equipment Inventory for Zapotitan, Atiocoyo Norte and Atiocoyo Sur

4 (2 - sets of 3 pages each) of Observations sent to the Minister of Agriculture from Atiocoyo Norte and Sur on February 3 & 4 , 1999

5 (1 -set of 3 pages) of List of Farmers who requested water service 1998 - 1999, totaling 193 28 Mz - 1st payment Cl 38,962 29 & 2nd payment Cl 14, 949 90
Note We were verbally informed that as of February the area was close to 300 Mz

6 (4 -sets of 25 pages each w/ 2 page cover letter) from Jose Medino H. , Exeutive Director of Executive commission of Hydroelectric from Rio Lempa to Ing Julio Alberto Olano Noyolo, General director of Natural an Renewable Resources of MAG, with a report attached on "Proposal on providing Electrical energy and demand for the Atiocoyo Norte Irrigation District"

7 A - 7 page letter from CASTRO on cost quotation for 3 pump units for Atiocoyo Norte I & D District

8 A - 3 page leter from CONSTRUMARKET and 2 sets of catalogs for for mobile equipment

9 Various old spreadsheet on I&D district's cost proposal's

10 Diskette copies of 9 above

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